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**The role of rumination in PTSD symptom maintenance:
an analogue study**

Warnock, Kristen

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Volume I

Main Research Project & Service Evaluation
Project

Kristen Warnock

Thesis submitted in partial fulfillment of the degree of
Doctorate in Clinical Psychology

Institute of Psychiatry, King's College London
May 2012

ACKNOWLEDGEMENTS

First and foremost, I would like to extend my gratitude to my research supervisors, Dr. Richard Stott and Professor Anke Ehlers, whose continued input and valued advice over each stage of this thesis' design and implementation has made this project possible. Their time spent discussing methodological issues, advising on statistical analyses and reading drafts was greatly appreciated. I would also like to give my heartfelt thanks to Khodayar Shahriyarmolki, my co-researcher on this study, for making the process of data collection, data entry and analysis that bit easier, and for his constant practical and emotional support over the duration.

Thanks must also go to each of my placement supervisors for their collective wisdom and encouragement: to Laura Lunt, Stuart Gibson, Robin Morris, Neil Hammond, Ailsa Russell, Alice Mills, Laura Tomlinson, Majella Byrne and Steven Livingstone, as well as to all of the clients I have been privileged enough to work with. It is thanks to their guidance and skilled supervision that I feel I have gained so much from each placement experience, and which I hope will stand me in good stead throughout my future career.

On a personal note, to my mother Betty, my father Brian, and to Hasan: thank you so much for your constant support and belief in me over the years - not least during the past three - and to Lauren, for all forms of sisterly support given. To Mike, for your endless patience, understanding and supportive encouragement since I first made the decision to switch to psychology over ten years ago. It has meant so much, and I look forward to starting the next chapter in our lives together.

Lastly, but by no means least, I would like to extend a big thank you to each and every one of my course-mates for making the past three years so much more than just a qualification. I feel privileged and thankful to have had you as my cohort - and as my friends. It would not have been the same without you.

Main Research Project

The role of rumination in PTSD symptom maintenance:
an analogue study

Supervised by: Dr Richard Stott
Professor Anke Ehlers

ABSTRACT

It has been well-observed in the literature that not every individual who experiences a traumatic event will go on to develop post-traumatic stress disorder (PTSD). Given this, a key focus within the field has been the examination of those factors which might serve to maintain PTSD symptomatology. In recent years, the potential role of rumination within disorder maintenance has been afforded greater attention, with accumulating evidence from clinical and non-clinical (analogue) studies to suggest its involvement. The evidence-base in this area thus far is outlined, with particular consideration given to the trauma-film paradigm, and the experimental induction of post-event rumination in consideration of symptom development and maintenance. It is noted that the few analogue studies to date utilising this paradigm have yielded mixed findings, and it is proposed that the one-off, brief periods of state rumination typically induced may have been insufficient to adequately parallel clinical rumination.

As such, this study sought to make a key adaptation to previous methodological approaches by extending the duration of the experimental manipulation to a one-week period, with repeated daily task completion between two testing sessions. The impact of induced rumination (compared to distraction) on selected PTSD-type symptoms was considered, both following the initial in-session experimental induction and after the extended week-long manipulation: specifically, the impact upon negative affect, intrusive images and physiological arousal (heart-rate response) was assessed. Physiological response to trauma-reminders was also examined as an index of stimulus generalisation.

As in previous analogue studies, results were mixed: contrary to hypotheses, a main effect of induced rumination on intrusive memories, affective change, or in-session physiological arousal was not indicated (with the exception of non-significant trend-level increases specific to anxious and fearful mood). However, an association was observed between *trait* rumination and intrusive memory maintenance over the extended rumination induction; the potential contribution of trait factors is explored and discussed. Additionally, the prolonged rumination engendered by the extended induction did appear to prime participants towards increased physiological responses to reminders of trauma (when previous medical experience was controlled for). Limitations regarding the interpretation and generalisability of the presented findings are outlined, and tentative indications as to the way in which these results may fit with current theoretical understanding are considered. Finally, the potential implications for clinical practice, and directions for future research, are discussed.

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1. INTRODUCTION

1.1 Chapter Summary

The chapter reviews the literature on symptom-maintenance within post-traumatic stress disorder (PTSD), with particular attention to the role of rumination. First, diagnostic criteria and the phenomenological features of PTSD (including intrusive memories, low mood, physiological arousal, and associated cognitive factors) are highlighted and two dominant cognitive models of PTSD discussed. Within this, the hypothesised peri- and post-traumatic mechanisms by which symptoms develop and are maintained are also briefly considered. As this study specifically seeks to explore the potential contribution of post-event rumination to this process within a trauma-context, definitions of rumination are reviewed and the emerging evidence-base on the potential relationship between rumination, intrusive memories, mood and physiological arousal is outlined, with respect to both clinical and non-clinical samples. Specifically, the methodological approach of replicative analogue studies within the trauma-film paradigm is detailed. The evidence for differential patterns of physiological responding to reminders of trauma (compared to neutral stimuli) is also considered. Finally, the rationale and aims of the present study are presented along with the key hypotheses for examination. The following literature was obtained through a search strategy whereby relevant keywords, including “rumination”, “PTSD”, “trauma” and “analogue”, were input into scholarly online journal databases: predominantly PubMed, Ovid and Science Direct. References of key articles were consulted in order to access further specific relevant articles.

1.2 Post Traumatic Stress Disorder (PTSD): diagnostic criteria, clinical characteristics & prevalence

PTSD is generally conceptualised as a clinical reaction which develops following exposure to a traumatic event, and is defined in the Diagnostic and Statistical Manual of the Mental Disorders-Fourth Edition (DSM-IV, American Psychiatric Association [APA], 1994) as ‘actual or threatened death or serious injury’ to self or others, with feelings of intense fear, helplessness or horror. Classified as an anxiety disorder in the DSM-IV (APA, 1994), diagnostic criteria include: the persistent re-experiencing of the event (through intrusive memories, dreams, or ‘flashback’ experiences); avoidance of stimuli associated with the

trauma; and persistent increased physiological arousal. Symptoms must be present for greater than one-month duration and represent significant distress or impairment of functioning in order to receive diagnosis; greater than 3-month duration meets criteria for chronic PTSD.

The ‘re-experiencing’ symptoms observed in PTSD can manifest in multiple ways. Recurrent, intrusive recollections of the event, including thoughts, images, and vivid sensory experiences, are commonly reported to be one of the hallmark characteristics of the diagnosis. Evidence has shown intrusive memories of the trauma to qualitatively differ from other forms of autobiographical memories, with visual intrusions being most common (Ehlers & Steil, 1995; Ehlers et al., 2002) and typically consisting of more vivid recollections which have a greater impact on mood state (Berntsen, 2001). The persistent avoidance of factors associated with the trauma reflects attempts by the individual to avoid external (e.g. situations, activities) or internal (e.g. thoughts or feelings) prompts that may trigger recollections of it. A sense of detachment from others, numbing, a reduced ability to feel emotions, and diminished interest in previously valued activities may also prevail. Increased physiological arousal to cues that act as trauma reminders are commonly reported; additionally, however, this may be accompanied by a more general hyperarousal which manifests as sleep disturbance, irritability/ anger outbursts, impaired concentration, hypervigilance and an exaggerated startle response.

Life-time and point prevalence rates of exposure to traumatic events and/ or risk of developing PTSD are subject to some variability across epidemiological studies, primarily due to differences in ‘stressor’ definitions and selection of diagnostic criteria (Breslau & Kessler, 2001). In the Detroit Area Survey of Trauma, Breslau et al. (1998) sought to examine lifetime history of traumatic events and PTSD within the community (as opposed to within specific high-risk samples typically studied e.g. war, natural disaster, rape). It was found that the risk of developing PTSD following exposure to trauma was 9.2%, with the highest risk associated with assaultive violence (at 20.9%). Similarly, the US National Comorbidity Survey (NCS, Kessler et al., 1995) estimated a 7.8% lifetime prevalence of PTSD for the US population aged 15–55 years, using DSM-III-R criteria. According to NICE Guidelines for PTSD (Guideline 26, 2005), around 25-30% of individuals who experience a traumatic event go on to develop PTSD.

Therefore, whilst evidence suggests that post-traumatic stress symptoms may be commonly experienced in the immediate aftermath of a traumatic event (Rothbaum et al., 1992; Kleim, Ehlers & Glucksman, 2007), and may in fact be a sign of normal adaption (Ehlers & Steil,

1995), only a minority of trauma survivors proceed to develop chronic psychological difficulties sufficient to warrant diagnosis (Breslau et al., 1998; Perkonig et al., 2000; McFarlane, 2000). The importance of identifying the key maintaining factors within the disorder is therefore evident, and recent cognitive models of trauma have sought to elucidate these mechanisms.

1.3 Cognitive models of PTSD

A variety of theoretical approaches have historically sought to conceptualise PTSD symptomatology. These have ranged from psychodynamically informed theories, such as Horowitz's (1976; 1986) stress response theory - in which traditional psychological defense mechanisms (promoting avoidance of the trauma memory) compete with opposing processes seeking memory integration, ultimately resulting in a psychic conflict to which the maintenance and persistence of intrusive recollections is attributed - to behavioural models rooted in conditioning theory (e.g. Keane, Zimering & Caddell, 1985). Within behavioural accounts, the adaptive process of extinction to the trauma memory is seen to be disrupted by avoidance strategies, thus compromising the effectiveness of exposure. Nevertheless, more recent methods of conceptualisation within clinical applications have been predominantly cognitive, particularly with respect to approaches seeking to account for the influence of rumination as a maintenance factor. As such, two contemporary cognitive models will be reviewed below; the revised dual representation theory (Brewin et al., 2010; based on the original model by Brewin, Dalgleish & Joseph, 1996) and Ehlers & Clark's (2000) cognitive model. Both theories present intrusive recollections as instances of 'faulty information-processing', with similar mechanisms of intrusion formation in which memory and encoding processes lie at the centre of aetiology and treatment (Holmes & Bourne, 2008).

1.3.1 Dual-representation theory (DRT; Brewin, Dalgleish & Joseph, 1996; Brewin, 2001; 2003; Brewin et al., 2010)

Brewin, Dalgleish & Joseph (1996)'s original dual representation model of response to trauma proposed two distinct memory forms: "verbally accessible memories" (VAMs), in which oral or written narratives of the trauma are adequately integrated with other autobiographical memories, and "situationally accessible memories" (SAMs), representing lower-level perceptual processing experienced at point of trauma (often sensory cues, such as sights, sounds or smells, or 'primary' emotions arising during the trauma event, such as anger or shame). It was posited that as the SAM system does not rely on verbal encoding, these memory forms are less likely to integrate with other autobiographical memories, and

are more likely to be activated by similar situational cues; as observed within the ‘flashback’ experiences of PTSD.

Within the updated version of the model (Brewin et al., 2010), the authors have sought to further develop these original theorized ideas, as well as to anchor the model more firmly in cognitive neuroscience, utilising evidence from this field regarding the role of specific memory systems. Accordingly, the authors have further clarified the concepts of the VAM and SAM systems, most notably re-terming VAMs as “contextual memory representations” (or C-reps), to better highlight the integrated and contextually-bound nature of this memory form rather than the ‘verbal’ accessibility emphasis previously given; and SAMs as “sensation-based memory representations” (or S-reps), to more fully emphasise their role within healthy memory in addition to the more pathological flashback experiences of PTSD. The authors provide evidence to suggest that C-reps are supported by the medial temporal lobe systems for declarative memory (hence the ease of voluntary recall consistent with other autobiographical memories), in contrast to the involuntary recall characteristics of the S-rep (supported by cortical and sub-cortical areas).

While transdiagnostic in its applicability to explaining intrusive memory experiences across diagnoses (including within depression), a central tenet of the model is that the intrusive re-experiencing characteristic of PTSD reflects an impaired association between the two forms of memory representation, in which comparably strong S-reps, and weaker C-reps, are laid down at point of trauma. Successful emotional processing and adaption is indicated when S-reps relating to the trauma have been adequately contextualised with pre-existing memories of the self/ world. Two key maladaptive emotional processing strategies prevent satisfactory integration, via preoccupation strategies or avoidance mechanisms. ‘Chronic emotional processing’ results when the discrepancy between prior assumptions and violation of these by the trauma is too great; as such timely resolution cannot be reached, leading to preoccupation with the memory. This form of processing is often associated with severe trauma experiences. ‘Inhibited emotional processing’ manifests when continued attempts to avoid reactivation of unwanted memories in turn prevents further emotional processing, maintaining patterns of cognitive, behavioural and affective avoidance.

Within this theory, a key implication for therapeutic intervention is the emphasis on aiding greater contextualization of the S-reps with C-reps, as well as the creation of alternative memories that can be preferentially retrieved: the key criterion for these competing representations simply being that they are more memorable, not necessarily more accurate or corrective in nature. As such, the model does not indicate a reliance on fundamentally

altering the existing encoded memories, and memories may be re-triggered by the right combination of cues in the future. The authors specifically highlight the potential benefits of therapies such as exposure, eye-movement desensitization therapy (EMDR), and imaginal reliving within this as tools towards aiding this memory integration. The DRT model (Brewin et al. 2010) presents a greater focus on the memory representations themselves, rather than on memory *processes* (Ehlers, Ehling & Klein, *in preparation*), and outline less of role for cognitive appraisals, either at the time of trauma or subsequently.

1.3.2 Ehlers & Clark's (2000) cognitive model

Ehlers & Clark's (2000) model similarly proposes a cognitive shift in processing during the trauma, away from a conceptual processing of events (focused on the contextual meaning attributed to any given situation) in favour of a perceptual processing style (with a predominant focus on sensory information). However, within this model, a greater emphasis is given to the key maintaining factors which serve to perpetuate a sense of external (e.g. world as unsafe) or internal (e.g. self as incapable) current threat. Two key mechanisms for the development of a persistent anxiety state are proposed: firstly, negative appraisal of the trauma and/ or trauma sequelae, and secondly, the way the trauma is encoded in memory (a poorly elaborated autobiographical memory which remains poorly integrated with other autobiographical information and memories, strong perceptual priming and strong associative learning). The appraisals and memory characteristics give rise to intrusive memories, arousal, and other emotional states. Individuals typically engage in a series of cognitive and behavioural responses intended to reduce distress, but which ultimately have the consequence of preventing cognitive change.

Negative appraisals of the trauma and its consequences may manifest as a result of misinterpretation of initial symptoms as catastrophic (e.g. intrusive recollections, mood swings, emotional numbing) rather than as a normal reaction to a stressful event and part of the recovery process. Idiosyncratic appraisals may also concern the impact of the trauma on other life domains (e.g. occupational, financial, interpersonal), and negative interpretation of others' reactions following the event. In sum, negative appraisals have the effect of creating an ongoing sense of serious current threat, with individuals with persistent PTSD unable to see the trauma as a time-limited event without global negative implications for the future. In addition, the type of appraisal predicts emotional response; perceived ongoing danger leading to fear, or perceived loss leading to sadness, for example.

Ehlers & Clark (2000) propose that during trauma, events are not encoded into autobiographical memory in the normal way, leading to poorly elaborated, data-driven memories which can be involuntarily reactivated by stimuli temporally-associated with the event. As such, in PTSD the trauma memory remains decontextualised and poorly elaborated, with memory fragments susceptible to being triggered by a range of sensory-similar cues. On these occasions, parts of the trauma are often re-experienced as if it is occurring *right now* (a quality termed ‘nowness’).

The model stipulates that in order to cope with these negative appraisals and trauma memories, individuals may engage in a series of maladaptive strategies to control their symptoms. Strategies selected are directly related to the individual’s negative appraisals, and may include cognitive strategies (e.g. thought suppression, where the person attempts to push trauma-related thoughts from their mind, or rumination about the event, where the individual tries to ‘make sense’ of the events that have happened) or behavioural responses (e.g. avoidance of situations in which reminders of the trauma may be generated, or engaging in preventative action). As such, the model has clear implications for treatment, with cognitive appraisals, memory integration and problematic coping strategies to be targeted.

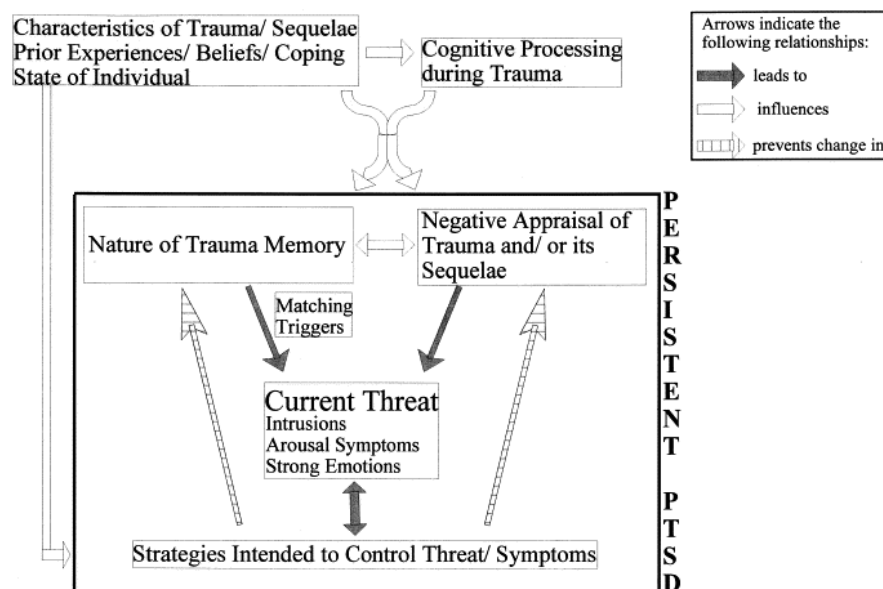


Figure 1: Ehlers & Clark's (2000) Cognitive model of PTSD

Both models provide a clear account of intrusion formation and rationale for the role of preoccupation with trauma-related thoughts in symptom maintenance. Brewin (2001; 2003) conceptualises preoccupation with respect to the delays generated as part of ‘chronic

emotional processing’; Ehlers & Clark (2000) specifically highlight the role of rumination as a cognitive maintaining factor. The authors suggest that while it is unclear how rumination maintains problematic appraisals of the trauma, it may serve to strengthen the negative appraisals via repetition, or serve a cognitive avoidance role similar to that suggested in worry (e.g. Borkovec, 1994). It is also hypothesised that through the provision of internal retrieval cues, rumination may directly increase the number of intrusive images of the event, as well as feelings of low mood, anxiety and hopelessness. Therefore, the cognitive models indicate distinct processes underlying rumination and re-experiencing symptoms (unlike the DSM-IV [APA, 1994] criteria, which fail to distinguish between such intrusive ruminative thoughts and memories); as such, the importance of examining them separately has been highlighted (Joseph, Williams & Yule, 1997; Ehlers & Steil, 1995; Ehlers & Clark, 2000; Holmes & Bourne, 2008; DSM-V draft).

1.4 Intrusive memories and rumination: definitions and phenomenology

1.4.1 Intrusive memories

Intrusive memories have been defined as “involuntary recollections relating to events that appear, apparently spontaneously, in consciousness” (Holmes & Bourne, 2008), as opposed to the deliberate retrieval of other types of autobiographical memories. Intrusions may take the form of mental images, sounds, smells or verbal thoughts (Speckens et al., 2007), and it has been suggested that emotional memories typically take the form of mental images, regardless of whether these are intrusive or deliberately recalled (Arntz, de Goot & Kindt, 2005).

Although less frequent than verbal thoughts, the experiencing of intrusive memories has been observed to occur with some frequency within the general population (Brewin, Christodoulides & Hutchinson, 1996). Through a series of studies within an undergraduate population, Berntsen (1996; 1999; 2001) demonstrated intrusions to occur several times a day using a structured diary methodology; similarly, Mace (2005) estimated prevalence at 1 - 5 intrusions per day in a healthy sample, with priming effects playing a substantial role in recollection. These common, everyday intrusions can therefore be associated with both positive and negative mood, and have been typically argued to present no concern for/ distress to the experiencer (Holmes & Bourne, 2008) although this may not always be the case (Berntsen & Hall, 2004). A comparison of involuntarily vs. voluntarily cued recollections of personal experience conducted by Berntsen & Hall (2004) suggested unintended memories to refer most often to specific episodes of more unusual and less

positive events, with a greater impact on mood and accompanied by increased physiological arousal. Evidence suggests that most individuals do have conscious awareness of intrusion occurrence: Berntsen & Rubin's (2002) survey of a large sample of the Danish population indicated involuntary recollections to be well-known, with 58% respondents able to identify the last experience of an intrusive memory, lending support to the diary methodology often utilised in intrusion monitoring.

It has been suggested that experiences of intrusive recollection may occur along a continuum, ranging from these types of everyday intrusions to the highly distressing psychopathological intrusions witnessed in disorders such as PTSD (Holmes, 2004). In support of a continuum conceptualisation, intrusive memories (often in imagery form) can be seen to arise within a range of other clinical disorders, including social phobia (Hirsch et al., 2003), psychosis (Steel, Fowler & Holmes, 2005) and depression (Patel et al., 2007); as a consequence, it has been suggested that the same mechanisms may be implicated in intrusion development, irrespective of disorder, indicating the possibility of a transdiagnostic process (Harvey et al., 2004; Steel, Fowler & Holmes, 2005).

Yet while intrusion experiences appear to be relatively common across both clinical and non-clinical samples, the intrusive memories typically experienced in PTSD have a number of delineating characteristics, and are among the most commonly endorsed symptoms of the diagnosis (Regambal & Alden, 2009). Additionally, it has been noted that intrusive memories are more frequently visual, rather than verbally-mediated thought-based intrusions (Ehlers et al., 2002), with a notable vivid perceptual content, and often consisting of emotional impressions (Berntsen, Willert & Rubin, 2003). As such, experiencers often describe a sense that the recalled event is happening 'right now' (Ehlers & Clark, 2000; Ehlers, 2002).

Using both cross-sectional and prospective comparative studies, Michael, Ehlers & Halligan (2005) sought to examine the nature of intrusive memories in previously traumatized samples, with and without PTSD. In both studies, it was highlighted that the presence of intrusive memories was not unique to the PTSD group; furthermore, there existed little difference between the groups regarding the likelihood that these consisted of sensory impressions. Visual sensations were most common across both groups, with smell and taste sensations least common. In the prospective study, while presence of intrusive memories at initial assessment predicted only 9% of variance in PTSD severity, and frequency only 8% of variance at 6-months post-trauma, symptom severity was more accurately predicted by the distress generated by the images; decontextualisation; and a sense that memories were being

re-lived in the present (an additional 37-43% of the variance). As such, given that neither the presence nor frequency of intrusive memories themselves are sufficient to predict PTSD persistence (see also McFarlane, 1988; Shalev, 1992) - and particularly considering the prevalence of intrusions within other clinical as well as non-clinical groups - it instead appears that it is this specificity in the quality of the intrusion that best predicts outcome. Although the *exact* relationship between intrusive memories and associated symptoms is unclear, it has been suggested that intrusions may play a pivotal role in driving other post-traumatic stress symptoms, therefore serving to maintain persistence of the disorder (Michael, Ehlers & Halligan, 2005).

The distinction between intrusive memories and other forms of intrusive thought have also been considered within the literature. Speckens et al. (2007) compared the phenomenological nature of intrusive memories in individuals with PTSD with the qualities of intrusive ruminative thought; again, findings suggested intrusive memories to be primarily sensory experiences rather than verbal, and of shorter duration (typically less than a minute) than ruminative experiences. However, it was also highlighted that the two phenomena may co-exist, with a high number of sensory experiences reported by participants while ruminating (Speckens et al., 2007). The concept of rumination is considered in more detail below.

1.4.2 Rumination

Rumination has commonly been defined as a repetitive and recurrent style of thinking, with a particular focus on past negative events and/ or consequential negative mood (Nolen-Hoeksema, 1991; Papageorgiou & Wells, 2004). With respect to its repetitive pattern, the concept of rumination is closely related to that of worry with the primary distinction being the time-orientation of each: whilst worry is predominantly concerned with future events, rumination is largely retrospective in nature. In a phenomenological study of rumination, Speckens et al. (2007) reported PTSD patients to ruminate most often about events in the past (73%) compared to the present (50%) or future (60%). It is well established that rumination plays a central role in maintaining symptoms of depression, with a narrowed focus of attention on one's symptoms and their implications (Nolen-Hoeksema, 1991; Nolen-Hoeksema & Morrow, 1991). Whilst potentially similar to negative automatic thoughts (NATs) in valence-related content, the two are not equitable, with longer periods of ruminative thought likely to be functionally different from short NATs (Michael et al., 2007). Rumination has also been shown to play a significant - and distinct - role to that of worry within the anxiety disorders (Fresco et al., 2002).

It appears important to specify the way in which rumination differs from other forms of repetitive, negative thinking about a trauma, which may, under certain circumstances, promote recovery from the event (for example, the repeated and detailed writing about a trauma experience and its consequences [Van Emmerik, Kamphuis & Emmelkamp, 2008], or the imaginal reliving techniques advocated within cognitive therapy [Ehlers et al., 2005]). As such, a distinction has been made by some authors between functional and dysfunctional forms of repetitive thought (Ehring, Szeimies & Schaffrick, 2009). Stöber's (1998) 'reduced concreteness' theory of excessive worry, originally developed to account for the characteristic thought processes observed in Generalised Anxiety Disorder (GAD), suggests a dominant role of abstract, verbal thoughts leading to indistinct and poorly delineated event processing. As a consequence, the individual avoids immediate distress, as fewer negative emotions and instances of imagery are triggered than would arise within a more concrete mode of thinking (similar to ideas proposed in Borkovec's (1994) cognitive avoidance theory of worry). The emotional processing of worry-related information is thus inhibited, as this would require activation of the emotional memory; additionally, the process interferes with successful problem-solving, which requires processing on a concrete level. Similarly, with respect to observations in depression, Watkins (2008) highlighted an abstract, generalised and evaluative form of thinking to be more problematic than a concrete, process-focused style. For the purposes of the current study therefore, rumination has been conceptualised as a generalised, abstract mode of thinking, characterised by the particularly maladaptive evaluative thoughts (such as '*why...?*', '*what if...?*') often observed clinically within PTSD (Michael et al., 2007).

1.5 Trauma film paradigm: investigating symptoms using non-clinical analogue samples

Since its introduction in the 1960's, the trauma film paradigm has proved a useful alternative to the retrospective research approach typically undertaken within PTSD samples. The majority of studies using clinical samples to examine the potential peri-traumatic factors implicated in PTSD (that is, the processes involved during the initial encoding of the trauma memory) has necessarily relied on individuals' retrospective reports of emotional response during the event. As such, the difficulties in obtaining accurate information and/or descriptions regarding past emotional states has been highlighted, potentially due to factors associated with problematic memory recall, including cognitive avoidance of reminders of trauma (Holmes & Bourne, 2008). In order to circumvent some of the difficulties associated with historical self-report, researchers have sought to utilise an alternative prospective

methodology in which non-clinical healthy controls are exposed to a trauma analogue, with an aim of replicating PTSD-type symptoms. The laboratory control offered by this approach enables further examination of the underlying mechanisms involved in symptom development and maintenance.

Early research using the trauma film paradigm focused primarily on demonstrating that physiological stress responses could be reliably induced within the laboratory setting, via the viewing of traumatic stimuli (Lazarus & Opton, 1964; Lazarus et al., 1965). Although trauma films can not necessarily induce the intensity of emotional response akin to a personal experience of a traumatic event, this research indicated the use of such an approach to hold some validity in enabling the replication of post-traumatic stress symptoms (Holmes & Bourne, 2008). Early evidence also suggested that the manipulation of instructional orientation, such as those instructions promoting emotional detachment, could play a role in participants' initial processing of events, affecting subsequent appraisals of the footage (Lazarus et al., 1965). This has important implications for methodological design, as it suggests that the instructions presented prior to viewing could potentially have as great an impact on the emotional appraisal of the film as the content itself (Lazarus et al., 1965).

The trauma film methodology typically follows a standardised structure, adapted according to the specific research aims, with correlational or between-group experimental approaches most widely utilised (Holmes & Bourne, 2008). First of all, participants are asked to complete a series of baseline questionnaires in order to highlight existing trait vulnerabilities or biases, or to exclude a clinical presentation. Immediately prior to exposure to the trauma film itself, participants complete state measures on variables of interest (typically affect or arousal ratings). Orientation during viewing of the trauma film may be manipulated according to the study's aims and design: participants may be asked to view the footage naturalistically, by simply witnessing the scenes presented; be instructed to adopt a specific processing style, such as a conceptual or perceptual approach (Halligan, Clark & Ehlers, 2002); or to engage in a concurrent task designed to mimic peri-traumatic processing (cf. Holmes, Brewin & Hennessy 2004). Alternatively, if post-event processing or coping is a focus area, participants may be asked to view the film naturally but to undertake certain tasks on its completion (e.g. Ehring, Szeimies & Schaffrick, 2009; Zetsche, Ehring & Ehlers, 2009). Following exposure to the film's contents, repeated state measures are taken to examine the impact of the film/ processing manipulations on critical dependent variables (typically intrusive memories, mood, and/or physiological arousal). A diary methodology is typically used over the week to assess the impact of the film/ manipulation on those

variables of interest, particularly intrusions, and is often seen as a critical component of the paradigm (Holmes & Bourne, 2008).

Whilst the peri-traumatic factors associated with the development of PTSD symptoms have been a focus of much of the work within the trauma film paradigm - particularly with respect to the role of dissociation in fragmented memory recall (Murray, 1997; Holmes et al., 2005; Ozer et al., 2003); the role of perceptual vs. conceptual peri-processing of events (Halligan, Clark & Ehlers, 2002; Holmes, Brewin & Hennessy, 2004); and in-film intervention strategies such as relaxation (Folkins et al., 1968) - more recent research has focused on those factors critical to the maintenance of such symptoms. Considering the relative minority of individuals presenting with persistent symptoms at the one-month mark, in comparison to a majority who demonstrate symptoms in the immediate aftermath of trauma (McFarlane, 2000), it appears increasingly important to achieve greater clarity in our understanding of the post-event factors contributing to this discrepancy. Furthermore, the fact that traumatic events cannot, for the most part, be anticipated, provides a strong rationale for the examination of post-traumatic cognitive factors - as these are the areas which can potentially be addressed in clinical intervention.

In particular, the literature on post-traumatic event processing has focused on the role of processes such as worry (Wells & Papageorgiou, 1995; Butler, Wells & Dewick, 1995), thought suppression (Davies & Clark, 1998), and rumination. A study by Butler, Wells & Dewick (1995), in which participants were randomised to either a “worry” or “imagery” group immediately following exposure to trauma footage, indicated participants in the “worry” group to experience a greater number of intrusions over the following three days (although no group difference was observed when a full week’s diary data was considered). Similarly, Davies & Clark (1998) provided evidence for the maladaptive role of thought suppression in maintaining intrusions: whilst participants who were asked to deliberately suppress film-related thoughts in a 2-minute period post-film reported fewer intrusions during this time compared to a control condition (instructed to “think freely”); they subsequently reported a greater number than controls in a further 2-minute period, once both groups were permitted to “think freely”.

In recent times, a number of authors have sought to examine the role of post-event rumination with regards to symptom maintenance, both within clinical samples and utilising the analogue paradigm. This is commensurate with a considerable body of evidence within other clinical arenas, most notably depression, indicating the substantial contributions of ruminative thought to disorder development and persistence (Just & Alloy, 1997; Nolen-

Hoeksema, 2000) including depression arising as a consequence of trauma (e.g. Nolen-Hoeksema & Morrow, 1991).

Within PTSD samples, rumination has been indicated to play a significant role in the severity and persistence of PTSD-related symptoms, emerging as one of the most powerful predictors (Ehlers, Mayou & Bryant, 1998; Clohessy & Ehlers, 1999; Murray, Ehlers & Mayou, 2002). Michael et al. (2007) undertook a comparison of individuals with a history of trauma experiences with and without current PTSD diagnosis. Although rumination occurred in both groups, ruminative thinking was more commonly observed in participants with PTSD; with these participants additionally spending a greater proportion of time ruminating. Presence of rumination in the PTSD group explained between 23% and 28% of variance in disorder severity, both concurrently and prospectively at 6-month follow-up. Similar results have been indicated by Ehrling, Frank & Ehlers (2008) who found rumination in road traffic accident (RTA) survivors to account for between 36% and 50% of the variance in PTSD symptom severity at 6-months. Further consideration of the evidence-base for the role of rumination in post-traumatic stress symptoms - including experimental evidence from the trauma-analogue paradigm - is outlined below.

1.6 Role of rumination in maintaining post-traumatic stress symptoms

1.6.1 Association between rumination and negative affect

In experimental studies, depressive rumination has long been implicated in the intensification of dysphoria and perpetuation of negative thinking (Watkins & Baracaia, 2002; Moberly & Watkins, 2006); additionally, within the PTSD literature, there is emerging evidence to suggest rumination plays a role in the presentation of negative affect (Michael et al., 2007; Speckens et al., 2007).

Although only a small number of trauma analogue studies have sought to establish the impact of induced post-event rumination upon symptom maintenance, the findings have consistently indicated even brief periods of induced state rumination to engender mood change. Ehrling, Szeimies & Schaffrick (2009) conducted a study of 83 healthy undergraduate students, exposing them to an analogue stressor comprising footage of road traffic accidents (RTAs), before assigning participants to an abstract ruminative thinking, concrete thinking or distraction (control) condition. In the abstract condition, participants were asked to read a transcript of a RTA- survivor's rumination episode, thinking about their experience in a particularly abstract way. Participants were then presented with a series of

abstract ruminative sentences, and asked to spend some time dwelling on each of these. In contrast, participants in the concrete condition were asked to read transcripts detailing the thoughts of an RTA-survivor, modified to represent a more concrete style of thinking, before being presented with concrete-thinking style sentences to think over. Both abstract and concrete conditions contained similar content; the distinction in thought *process* being the critical differentiating factor. Participants in a distraction condition were asked to read a transcript of thoughts completely unrelated to the RTA- video, and following this, to read and answer a series of factual questions.

While participants in the distraction (control) and concrete thinking conditions experienced a decrease in negative mood and arousal (pre- to post- manipulation), participants in the abstract thinking condition demonstrated maintenance of negative affect. This provided support for the view the detrimental effects of trauma-related rumination are attributable to specific styles or modes of thinking (given the similarities in content of the abstract vs. concrete manipulations). Similarly, negative mood was also maintained for a rumination condition only (compared to distraction controls), when personal, past events were used as an alternative analogue (Ehring, Fuchs & Kläsener, 2009).

The dual representation theory of PTSD (Brewin, Dalgleish & Joseph, 1996; Brewin, 2001; 2003) distinguishes between specific emotions likely to arise at different stages. For example, primary emotions most strongly experienced during the course of trauma, such as fear, arising initially; with secondary emotions such as sadness or anger, emerging with greater intensity following the trauma. Ehlers & Clark's (2000) model of PTSD suggests rumination may strengthen negative appraisals of the trauma event through repeated rehearsal (hence giving rise to such cognitively complex emotions as sadness or guilt), in addition to serving as a direct trigger for previous negative emotions and arousal. In a comparison of the impact of rumination and intrusive memories on the reported emotional reactions of patients with PTSD, Speckens et al. (2007) found rumination (and not intrusive memories) to be significantly associated with feelings of shame, with an emerging trend towards sadness and guilt also observed. In support of the cognitive model, the authors propose that rumination may be an important mechanism by which emotions such as sadness, shame and anger are maintained following a traumatic event.

In considering specific differences within negative mood, an experimental study by Zetsche, Ehring & Ehlers (2009) found induced state rumination following exposure to a trauma analogue to hamper recovery from sad mood *specifically*, compared to either distraction controls or a second experimental (memory integration) condition. Although presentation of

the trauma analogue led to significant increases in both sadness and fear, only an effect for sadness emerged following the manipulation. The authors suggest this finding may relate to the initial emotional impact of the trauma video: particularly, that fear responses may have been inhibited by the degree of personal distance created in third-party observation of events in the video (Zetsche, Ehring & Ehlers, 2009). Alternatively, this may reflect differences in the impact of rumination of the maintenance of primary (fear) vs. secondary (sadness) emotions, as theorised within the dual representation theory of trauma.

It has been proposed that the process of rumination may serve a cognitive avoidance function, similar to that suggested within worry (Borkovec, Shadick & Hopkins, 1990), with prolonged periods of engagement in verbal activity serving to distract from more specific and distressing trauma-related cognitions. This may include avoidance of experiencing visual memories of the worst moments of the trauma (Ehlers & Steil, 1995). In spite of its protective intent, rumination appears to have a continued impact on negative mood, as outlined above. Speckens et al. (2007) explains this apparent discrepancy by highlighting that even if rumination does serve as a temporary distraction from the most emotionally laden aspects of the trauma, the *content* of ruminative thought is still highly negative in nature, thus maintaining low mood. The impact of rumination on the re-experiencing of intrusive memories, including imagery, is considered below.

1.6.2 Association between rumination and intrusive memories

Given evidence suggesting the influential role of ruminative thinking in maintaining symptoms of PTSD, a number of clinical and analogue studies have sought to examine the impact upon frequency, and to a lesser extent, quality of intrusions. Within the worry and depression literature, rumination around a particular event has been well documented to increase numbers of intrusions (Watkins, 2004; Wells & Papageorgiou, 1995; Butler, Wells & Dewick, 1995). However, despite the solid evidence-base indicating rumination to prolong experiences of negative mood, the association between rumination and intrusive memories is less clear.

A number of analogue studies have hypothesised that periods of induced state rumination would lead to increased numbers of intrusive memory experiences, following exposure to a trauma analogue. In support of this, Ehring, Fuchs & Kläsener (2009) observed a maintenance in the number of intrusive memories (pre- and post- exposure to an analogue trauma stressor) following a brief rumination induction, compared to the decrease in intrusions reported by controls. Specifically, the selected analogue-stressor required

participants to present a detailed narrative of a past distressing life event: recall of the narrative in the testing session was associated with an increase in negative mood, and gave rise to a number of intrusive memories. Consideration of condition indicated that participants who were subsequently asked to ruminate on previously narrated events experienced intrusive memories at a similar frequency - and with similar levels of distress - as experienced immediately following the analogue. In contrast, control participants completing a distraction task reported significantly fewer intrusions compared to baseline (post-narration).

Subsequent studies, however, have not fully replicated these findings (Zetsche, Ehring & Ehlers, 2009; Ehring, Szeimies & Schaffrick, 2009), with no consistent differences observed with regard to experimental manipulations. In a study by Zetsche, Ehring & Ehlers (2009), using a RTA-film stressor, participants were assigned to one of three post-video processing conditions: either a rumination, memory integration or distraction condition. Triggered intrusive memories (in response to probes) and spontaneous intrusive memories (sampled during 2-minute rest periods) were assessed. To maximise the personal relevance of the rumination sentences presented, participants were only given sentences previously identified as consistent with naturalistic thoughts arising during viewing of the trauma film. Ruminative thoughts (resembling the ‘why’ and ‘what if’ form clinically observed) were presented to participants on screen, and individuals were asked to dwell on each question and its implications for as long as possible, allowing their thoughts to drift to related topics as is characteristic of the ruminative process. In contrast, participants in the memory integration condition were instructed to process the film material in a way designed to enhance memory coherence; in particular, being encouraged to consider the likely chronological sequence of events depicted in the video, and to adopt a self-referential perspective in doing so, distinguishing those experiences of road-traffic from their own non-trauma related experiences. Participants in the control condition completed a verbal distraction task, paralleling the verbal tasks of the two experimental conditions.

Despite the video being rated as sufficiently distressing (and those in the control condition reporting less rumination, less memory integration and less distress), this main effect of manipulation was not found for all participants (Zetsche, Ehring & Ehlers, 2009). Yet interestingly, when gender was considered as an additional factor, differences between the groups emerged. While men in the rumination condition experienced significantly more intrusive memories - both triggered and spontaneous - than those in the distraction condition, with memory integration-subjects reporting the fewest number of intrusions (in line with the hypotheses), a different picture emerged for female participants. With regards to triggered

memories, women in the memory integration condition reported a significantly greater number of intrusions compared to the rumination or distraction (control) condition, with no effect of condition found for spontaneous memories. This gender difference was interpreted with some caution by the authors, given the relatively small number of male participants included in the study. However, the possibility that the induced processing styles may have had differing effects on men and women was considered; particularly that the memory integration task may have unintentionally induced rumination. Despite the complex picture emerging in relation to condition, a clearer association between *degree* of state rumination (regardless of condition) and the number of intrusive memories was highlighted in correlational analysis. As such, although the effects of the manipulation may have proved insufficient in elucidating clear associations, this correlational support appears consistent with results from prospective clinical studies, in which rumination has been indicated to predict PTSD symptomatology.

Similarly, a third analogue study of note was conducted by Ehring, Szeimies & Schaffrick (2009) with the aim of examining the reduced concreteness hypothesis of rumination. Participants were assigned to either an abstract thinking condition (designed to replicate ruminative thinking), a concrete processing condition, or a distraction control. Frequency of intrusive memories were assessed post-manipulation as well as in response to trauma reminders. Participants in the concrete (but not abstract) condition reported significantly fewer intrusions than controls, which the authors interpret as indirect evidence in support of the view that a concrete-processing style promotes greater emotional adaptation than an abstract ruminative approach. However, contrary to expectations, participants in the distraction condition reported the highest number of intrusive images in response to reminders. Whilst potentially attributable to unintended effects of thought suppression, an alternative explanation is that participants here were not provided with further opportunities for post-event processing (unlike the opportunity afforded in both abstract and concrete conditions).

In summary, within the small evidence-base that does exist, the nature of proposed associations between rumination and the maintenance of intrusive memories remains inconclusive; with only one study tentatively indicating rumination as actively influential in intrusion maintenance (Ehring, Fuchs & Kläsener, 2009). The absence of consistent effects in the hypothesised direction could be interpreted as consistent with the cognitive avoidance theory of rumination, in which abstract rumination functions as a means of escaping intrusive memories (Michael et al., 2007). As an additional consequence of this research, supplementary findings regarding the potential impact of concrete thinking (Ehring,

Szeimies & Schaffrick, 2009) and distraction mechanisms (Ehring, Szeimies & Schaffrick, 2009; Ehring, Fuchs & Kläsener, 2009), including possible gender effects has emerged (Zetsche, Ehring & Ehlers, 2009), providing a complex picture of post-event processing mechanisms. An important consideration when reviewing the studies above, is the extent to which one-off rumination inductions are able to capture the persistent ruminative style characteristic of PTSD. It is conceivable that current methodological designs utilising a brief rumination induction have failed to adequately mirror ‘real life’ ruminative processes. As such, the relationship between rumination and the maintenance of intrusive memory experiences warrants further investigation, and the direction and phenomenology of any such association remains to be established.

1.6.3 The role of state vs. trait rumination

The degree to which rumination can be conceptualised as a stable, trait-like quality, as opposed to a transient state process has been debated in the literature (Smith & Alloy, 2009). In particular, stability of rumination has been defined as an individual’s tendency to ruminate when presented with a trigger; it does not assume that an individual will engage in constant ruminative thought. Whilst trauma analogue studies have typically sought to randomise participants across conditions in order to minimise trait differences between groups (including repetitive thought, amongst other variables), the direct role of trait rumination has received less attention, potentially due to this theoretical overlap in concepts. It is, however, possible that the stronger results emerging for correlational analyses between state rumination and intrusive memories (e.g. Zetsche, Ehring & Ehlers, 2009) may in part be attributable to trait factors; that is, it appears likely that participants with levels of high trait rumination will engage with greater ease in periods of induced state rumination than participants with lower trait levels. As such, the potential contribution of trait rumination, particularly in relation to intrusive memories, might be an important factor for consideration.

Within the depression literature, trait rumination has long been posited to maintain negative mood states (Nolen-Hoeksema, 1991; Thomsen, 2006); however, more recently the interaction of trait rumination with an abstract, evaluative processing mode (as occurs within state rumination) has been shown to influence emotional vulnerability. Moberly & Watkins (2006) found that for participants assigned to an abstract, evaluative processing mode, only those with high levels of trait rumination experienced increases in negative mood following a failure task. As a result, trait rumination may have a more dominant impact on affect than posed by state rumination. In particular, the authors suggest that heightened levels of trait

rumination might exacerbate an individual's emotional vulnerability, hence providing increased opportunities for the training condition to take effect.

1.7 Physiological responses to trauma-reminders

1.7.1 Physiological arousal and stimulus generalisation in PTSD

As outlined previously, the DSM-IV (APA, 1994) places heightened physiological arousal, in response to both external and internal cues, as among the core diagnostic features of PTSD. In line with this, associative learning models of PTSD suggest that during trauma, fear responses become associated with stimuli present at the time, as well as generalising more broadly to related stimuli (Foa, Steketee & Rothbaum, 1989; Keane et al., 1985). Ehlers & Clark's (2000) cognitive model outlines this process in greater detail, also proposing that a strong perceptual priming (a form of implicit memory) effect typically occurs for stimuli temporally associated with the traumatic event. It is suggested that the switch to a more prominently data-driven mode of processing during the course of trauma leads to a reduced threshold for encoding sensory features (potentially as a result of heightened emotional states); it is the most salient perceptual aspects of the trauma environment that are likely to be noticed and encoded into memory. However, given the diminished resources for encoding at this time, such data-driven memory cues may be insufficiently differentiated from other memory traces (Baddeley, 1997) and are liable to being involuntarily triggered by other benign, albeit perceptually (often visually) similar stimuli. As such, a variety of idiosyncratic cues may give rise to re-experiencing symptoms, including heightened physiological arousal. The phenomenon of re-experiencing as a consequence of poor discrimination between stimuli has been widely termed 'stimulus generalisation' in the literature.

In line with this theoretical stance, evidence that PTSD sufferers demonstrate heightened reactivity in the context of trauma-reminders has been consistently demonstrated in the literature (e.g. Orr, 1994; Orr 1997). This effect has been illustrated through examination of heart-rate response, as well as measurements of skin conductance, blood pressure and facial electromyogram (Orr & Roth, 2000). Of these, the most sensitive measure of discrimination between PTSD and non-PTSD samples has been indicated to be heart-rate response (Pole, 2007).

Studies examining physiological responses to reminders of trauma have implemented one of two methodological approaches: the presentation of individually-tailored trauma reminders,

such as idiosyncratic stories or trauma imagery (e.g. Orr et al., 2002; Elsesser, Sartory & Tackenberg, 2004), or alternatively, presentation of standardised trauma cues, such as trauma-relevant pictures (e.g. Ehlers et al., 2010; Suendermann et al., 2010). Arguably, findings arising from the presentation of standardised cues provide greater evidence for a stimulus generalisation response, indicating a lack of specificity in discrimination between situationally-similar stimuli (such as accident-related pictures presented to RTA survivors). Additionally, this approach would provide greater clinical utility in that it potentially facilitates the ease with which physiological screening after trauma might be used. The benefit afforded by this is the potential identification of those individuals displaying stimulus generalisation at an early stage, and therefore, at greater risk of developing acute PTSD.

Although the findings of early studies using the standardised cues approach did not indicate clear physiological differences between survivors with and without PTSD (e.g. Blanchard et al., 1994; 1996), subsequent findings have been more promising. Rabe et al. (2006) measured heart-rates both at baseline, and during exposure to a series of neutral, positive, negative and trauma-related pictures. Participants with diagnoses of PTSD and subsyndromal PTSD showed increased heart-rate reactivity (as well as elevated heart-rate at baseline) to trauma-relevant cues only, when compared to non-traumatised survivors and healthy controls. Similarly, Ehlers et al. (2010) found patients diagnosed with acute PTSD at one-month post-trauma to show greater heart-rate response to pictures of personally salient (matched to trauma-type) than non-traumatised survivors (see also Suendermann et al., 2010). Specifically, a more substantial proportion of the acute PTSD group showed heart-rate acceleration of greater than 1 beat per minute, and a lower level of mean deceleration when compared to non-traumatised controls - in response to trauma-relevant pictures only. No between-group differences in physiological arousal were observed in response to either generally threatening or neutral pictures. This is in support of previous findings indicating that the increased reactivity observed within PTSD patients remains specific to trauma-related stimuli, rather than stimuli of high emotional valence, or distressing content more generally (Orr & Roth, 2000; Elsesser, Sartory & Tackenberg, 2004).

1.7.2 Differential heart-rate responses to trauma-relevant vs. neutral visual stimuli

A number of researchers examining the nature of physiological arousal have considered patterns of heart-rate response to different types of pictorial stimuli. In PTSD samples, increases in heart-rate to trauma-reminders appear largely consistent with a stress-arousal response style, in which cardiac acceleration - generally associated with a fear response - has been interpreted as a defensive reaction (Bradley, Cuthbert & Lang, 1996). This initial

cardiac acceleration has also been observed within other clinical contexts; for example, within specific phobia patients on presentation of their phobic object (Lang et al., 1998). In contrast, within non-clinical samples (or control participants), a *deceleration* in heart-rates has typically been observed on presentation of the same pictures (e.g. Lang et al., 1993; Ehlers et al., 2010). A similar pattern of results was found by Adenauer et al. (2010), in which trauma-exposed participants without PTSD showed an initial decline in heart-rate on presentation of aversive stimuli, in contrast to the immediate increases observed within the PTSD group.

Within the non-clinical arena, the impact of pictures of different emotional valence has been examined. Bradley et al. (2001) compared physiological responses to ‘unpleasant’, ‘pleasant’ and ‘neutral’ pictures. ‘Unpleasant’ pictures, which included highly aversive and threatening content, prompted a significantly greater deceleration in heart-rate than either ‘pleasant’ or ‘neutral’ pictures, followed by a subsequent acceleration effect. Findings were interpreted as supportive of the ‘defense cascade’ model outlined by Lang, Bradley & Cuthbert (1997), in which a two-stage theory of the mechanisms behind defense activation is proposed. In contrast to the stress arousal model, in which cardiac acceleration arises as an immediate consequence of threat, the defense cascade model posits that an initial sustained deceleration in heart-rate reflects a freezing or ‘orienting’ response (Lang et al., 1993; Bradley et al., 2001), in which the individual aims to orient their attention in acknowledgement of distal threat. This is closely followed by acceleration in heart-rate, reflecting the need for an active defensive response (representing response to imminent attack). While this model is in contrast to the evidence arising from cardiac reactivity within PTSD, it does indicate that even within healthy controls, aversive stimuli may generate differential heart-rate reactions to those evoked by less emotive stimuli. Adenauer et al. (2010) propose that the almost immediate cardiac acceleration towards unpleasant pictures observed by PTSD patients is suggestive of alternative defensive reactions in these individuals - and thus a faster ‘fight or flight’ response. This may, in part, be due to the exaggerated startle response exhibited in PTSD (Adenauer et al., 2010).

1.7.3 Association between rumination and physiological arousal

Symptoms of arousal in PTSD have been suggested to arise in response to internal (as well as external) reminders of the trauma (DSM-IV [APA], 1994). Trauma-related rumination about the event may serve as one such internal cue. Preliminary evidence emerging from the trauma-film paradigm has indicated that induced rumination may be associated with increases in physiological arousal, as determined by heart-rate response. Specifically, post-

event abstract ruminative thinking (following exposure to a trauma film) led to the persistence of raised heart-rate, compared to a decrease in arousal found in both distraction controls and concrete processing conditions (Ehring, Szeimies & Schaffrick, 2009). An objective measure of physiological arousal was also considered by Ehring, Fuchs & Kläsener (2009). Whilst all participants did in fact display increases in arousal during the self-referential trauma analogue, a main effect of post-event processing was not found indicating no difference in heart-rate response to rumination compared to a distraction task. As such, the nature of the link between heart-rate responses to ruminative processing remains to be established.

1.8 Summary and rationale

The literature presented conceptualises the emergence of post-traumatic stress symptoms as relatively common reactions to a high stress or traumatic event. Whilst symptom development may be primarily influenced by peri-traumatic factors, it has been argued that the continuation of such experiences is likely to reflect the involvement of alternative post-event processes. An emerging evidence-base within clinical samples has demonstrated trauma-related rumination to explain significant proportions of the variance with respect to the persistence and severity of PTSD.

Similarly, early indications from experimental studies (using non-clinical populations) highlight ruminative thought to be influential in the maintenance of certain key symptoms associated with the disorder: most notably, the continuation of negative affect. However, there exists mixed evidence as to the prominence of rumination within the maintenance of intrusive memories and physiological arousal. Owing to ethical constraints in research conducted using clinical samples, the trauma-analogue paradigm has enabled greater examination of the mechanisms involved in symptom development and/or maintenance. As such, this approach now been widely accepted as a valid and highly useful methodological tool (Holmes & Bourne, 2008). However, to date, the literature in this area remains sparse, with (to the author's knowledge) only three analogue studies specifically investigating the role of rumination in PTSD symptom maintenance.

Additionally, it has been suggested that the mixed findings may reflect a methodological limitation of these studies; that is, that the brief one-off rumination inductions conducted may not sufficiently resemble the more persistent rumination clinically experienced in PTSD. The implication here is that as such, these experimental manipulations have not been

able to maintain either intrusive memory experiences or physiological symptoms. Furthermore, no analogue studies have yet examined the potential role of rumination with regards to its involvement in the generalisation of physiological responses to trauma-related stimuli, compared to emotionally neutral pictures.

Accordingly, this study seeks to further elucidate the nature of the association between ruminative thought and key post-traumatic stress symptoms, in the context of the trauma film paradigm. In particular, it aims to address a potential methodological limitation of the previous research detailed via an extension of the experimental rumination induction to cover a one-week period. The clinical implications of any such associations would pertain to a greater emphasis on rumination-focused intervention within current PTSD treatment protocols. This study aims to serve as a first, exploratory step in this direction.

1.9 Aims of the present study

Specifically, this study aims to provide further evidence for the role of rumination upon the maintenance of selected key symptoms consistently associated with PTSD: negative affect, intrusive memories and physiological arousal; and within the context of an analogue design. In particular, given the evidence that visual intrusions are especially common in this context (Ehlers & Steil, 1995; van der Kolk & Fisler, 1995), intrusive *images* were selected as a focus for examination. In addition to consideration of a brief in-session experimental induction, this research aims to implement a key change to previous methodology by extending the course of the experimental condition to incorporate a repeated, daily rumination/ control (distraction) induction over a one-week period. It was hoped that this methodological adaptation would more closely parallel the persistence and phenomenology of ‘real life’ rumination observed clinically, as a means of providing further evidence for the association between rumination and our specified dependent variables. Additionally, this study aimed to provide a preliminary exploration of whether rumination might play a role in the phenomenon of stimulus generalisation, by investigation of heart-rate responses to trauma-related and neutral pictures at the second session, after the week’s extended induction.

1.10 Experimental Hypotheses

In summary, the study aimed to address the following hypotheses:

Hypothesis 1: Participants in the rumination condition will report greater increases in low mood and anxiety at Session 2 than participants in the control condition

Hypothesis 2: In the period immediately following the experimental induction, participants in the rumination condition will report a greater increase in negative affect and a greater decrease in positive affect than participants in the control condition.

Hypothesis 3: Participants in the rumination condition will experience a greater number of intrusive images over the week than participants in the control condition.

Hypothesis 4: In the period immediately following the experimental induction, participants in the rumination condition will report a greater number of intrusive images than the control condition.

Hypothesis 5: In the period immediately following the experimental induction, participants in the rumination condition will report greater spontaneously occurring rumination (on the PTQ-S) than participants in the control group.

Hypothesis 6: Participants in the rumination condition will show a greater increase in physiological arousal (heart-rate response) during the experimental manipulation compared to baseline than controls.

Hypothesis 7: Participants in the rumination condition will show greater physiological arousal (heart-rate response) to trauma-related pictures than controls. Participants in control and rumination conditions will not differ in heart-rate responses to neutral pictures.

2. METHODOLOGY

2.1 Experimental Design

This experimental analogue study aimed to replicate and examine the effects of rumination using a non-clinical sample. The study primarily used a between-subjects design, involving two main phases across two testing sessions. Following exposure to a trauma analogue, participants were randomly allocated to either an experimental (rumination training) or control (distraction) condition. An extended week-long manipulation was conducted. For the primary hypothesis, changes in low and anxious mood over the one-week period constituted the principal dependent variable, given the established evidence-base of the impact of rumination on mood. The number of intrusive images experienced over the week were also assessed, using a mixed between-groups repeated measures design. Secondly, the impact of the trauma film on a number of dependent variables immediately following the experimental manipulation (Session 1) was investigated across conditions. Dependent variables included: (a) number of intrusive images experienced post-manipulation; (b) pre- and post-manipulation measures of mood; (c) changes in heart-rate response. Thirdly, at Session 2, all participants completed a picture-task in which they were exposed to (a) trauma (RTA)-related, (b) generally threatening or (c) neutral pictures. Between-group differences in heart-rate responses were considered as an index of stimulus generalization. The relationship between trait measures of trait rumination and the number of intrusive images experienced over the week was also investigated.

2.2 Power Analysis

In order to calculate the necessary sample size, a power calculation was conducted utilizing the effect sizes of prior research. As previous studies within the analogue PTSD literature have not consistently found effects for state-induced rumination in producing intrusive memories, an estimate for power analysis was based on one study in which a difference between groups (ruminators and distraction controls) was found (Ehring, Fuchs & Kläsener, 2009). In this case, rumination was found to maintain the number of intrusive memories, compared to the decrease observed in controls, with an effect size of $d = 0.933$. Using this effect size, it was calculated that setting power at 80% with an alpha level of 0.05 would indicate a total sample size of 40 (20 in each group).

However, given that other studies have not yet replicated this effect, finding no difference between ruminators and controls on intrusive memories (e.g. Zetsche, Ehring & Ehlers, 2009; Ehring, Szeimies & Schaffrick, 2009), use of a more conservative effect size was indicated. It was calculated that an effect size of 0.65, setting power at 80%, with an alpha level of 0.05 would indicate a sample size of 78 total (39 in each group) using an independent two group t-test for the primary hypothesis. It was hoped that utilising this moderate effect size to calculate power would serve to balance the feasibility of recruitment against the risk of making a type II error.

2.3 Recruitment

All subjects were recruited via circular emails sent to both students and staff at Kings College London (KCL). On response to the initial email, participants were sent the Information Sheet (Appendix A) and asked to provide a telephone number and convenient times to be contacted by the researcher. A screening telephone call was conducted with all participants who provided the necessary contact details. Screening questions aimed to identify: any history of trauma experiences, including road traffic accidents (RTAs); any history of family members' or close friends' involvement in RTAs; current and/or previous mental health diagnoses; and previous involvement in similar research studies. Following this screen, if participants met criteria and were eligible for inclusion, times for both testing sessions were arranged.

2.4 Inclusion and Exclusion Criteria

Adults 18 years of age or above were eligible for inclusion in the study. Exclusion criteria included: any personal history of trauma experiences (including personal involvement in a severe RTA); current mental health diagnoses (including blood injury phobia) or current service involvement; current medical conditions affecting heart rate. One participant was excluded on screening due to personal history of a severe RTA. Participants were required to be English-speaking as a first language (defined as having learnt before the age of 3 years of age). If a participant disclosed previous mental health diagnoses or treatment, this was explored as part of the screening telephone call and a judgment about inclusion made on an individual basis, in consultation with supervisors. None of the participants screened were excluded on the basis of previous mental health diagnoses or treatment. All participants were also considered according to additional exclusion criteria relevant to an associated research project (notably, a history of neurological disorders).

Participants with experience of minor road traffic accidents were not excluded, if they chose to participate with informed consent. As part of the telephone screen, subjects were also asked about any other research studies they had participated in at the IOP. Those who recalled taking part in research examining intrusions, or research which had required exposure to a similar analogue stressor, were not chosen to participate. This was due to the likely similarity in tasks to be administered, as well as having previously received a full debrief of research aims and hypotheses.

2.5 Participants

In total, 83 participants completed session one: 41 in the rumination group and 42 in the control group. One further participant did not have data included in this study due to falling asleep during the trauma film, and as such did not complete Session 1. All 83 participants that completed the first session returned for Session 2 one week later. Of these, an additional participant was excluded from all analysis due to failing to disclose prior participation in similar research until after Session 1. Of the 82 participants whose data was considered in analyses, 64 were female and 18 were male. A simple randomization procedure was used to allocate participants to each condition, stratified by gender to allow for post-hoc examination of any sex differences. The randomization strategy utilized two identical, closed envelopes containing instruction for allocation to either the ‘control’ or ‘rumination’ condition, which the researchers blindly selected on the participant’s arrival at the first testing session. Once the maximum required number of female/ male participants had been reached for one condition - based on numbers of total participants booked in - any remaining participants were allocated, by default, to the other condition. Subsequently, there were 32 females and 9 males in each condition (given a lower male response rate to the initial recruitment emails). The mean age of participants was 23.8 years (S.D = 5.19, range 18 – 49), with the majority being undergraduate students (n = 63, 76%) affiliated with Kings’ College London.

Figure 2 (below) highlights participants’ response rates throughout the recruitment process.

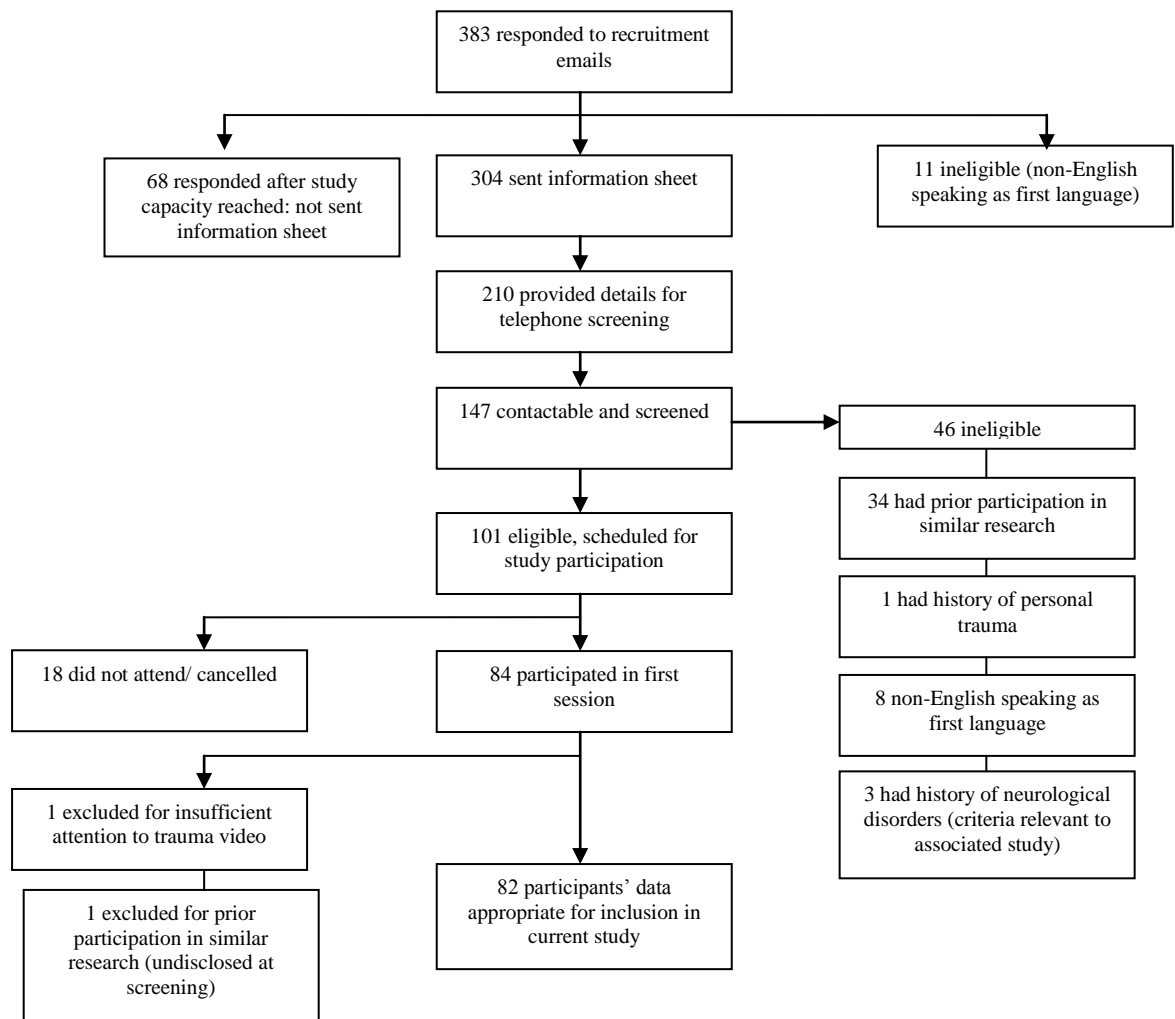


Figure 2: Participant response rates throughout the recruitment process

2.6 Measures

Throughout both sessions, participants were asked to complete a number of measures documenting their mood, intrusions, and subjective levels of physiological arousal. Trait measures of rumination and anxiety were also given prior to the first testing session. These measures are described in more detail below. A copy of all questionnaires administered can be found in Appendix D.

2.6.1 Perseverative Thinking Questionnaire (PTQ; Ehrling, 2007; 2011)

The Perseverative Thinking Questionnaire is a 15-item self-report measure which provides a content-independent measure of rumination, assessing different styles of thinking (including repetitiveness, intrusiveness, and uncontrollability of thoughts). The PTQ has two forms,

examining both long-standing trait rumination (PTQ-T) as well as transient state rumination (PTQ-S). The trait version was adapted from the original state form of the questionnaire. The PTQ has been reported to have good internal consistency ($\alpha = .95$), as well as good reliability and convergent validity with other measures of repetitive negative thinking, in both clinical and non-clinical samples (Ehring et al., 2011). In both forms, participants are asked to rate each item on a scale ranging from '0' ('*never*') to '4' ('*almost always*'), with a total score ranging from 0-60.

In this study, the PTQ-T was administered prior to Session 1 to assess participants' *general* tendency towards rumination. The PTQ-S was given at particular points of interest within the testing session, to examine the extent to which participants engaged in *temporary* periods of rumination.

2.6.2 Ruminative Responses Scale (RRS): subscale of the Response Style Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991)

The Ruminative Responses Scale (RRS) is a 12-item questionnaire forming part of the RSQ, specifically assessing the tendency of participants to engage in a series of ruminative responses at times of feeling sad or depressed. The RRS has been extensively used in research assessing the role of ruminative coping in depression (e.g. Nolen-Hoeksema, Parker & Larson, 1994; Kasch, Klein & Lara, 2001), and within analogue PTSD studies (e.g. Zetsche, Ehring & Ehlers, 2009). Responses are scored on a five-point Likert scale ranging from '1' ('*never*') to '4' ('*always*'). The RRS subscale has been shown to have good internal consistency ($\alpha = .89$; Nolen-Hoeksema & Morrow, 1991).

In this study, the RRS was administered along with the PTQ-T prior to the first testing session, as an additional measure of trait rumination.

2.6.3 Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990)

The PSWQ is a 16-item instrument designed to measure the trait characteristic of worry. Each item requires a response on a five-point scale ranging from '1' ('*not at all typical of me*') to '5' ('*very typical of me*'), indicating the perceived pervasiveness, excessiveness and uncontrollability of worry. Total scores range from 16 – 80, with higher scores indicative of greater trait or pathological worry (Molina & Borkovec, 1994; Startup & Erickson, 2006). The measure has been found to demonstrate high internal consistency in college samples (e.g. $\alpha = .92$; Davey, 1993; $\alpha = .91-.95$; Meyer et al., 1990) and good test re-test reliability

among non-clinical student populations (e.g. $r=.92$ over an 8-10 week interval; Meyer et al., 1990).

The PSWQ was administered prior to Session 1 as a further trait measure of repetitive negative thinking; on this occasion, namely worry.

2.6.4 State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983)

There are three forms of the STAI in existence: the revised STAI Form Y was selected for use in this study due to its differentiation between temporarily induced state anxiety versus enduring personality trait anxiety in adults. Both the trait (STAI-T) and state (STAI-S) form contain 20 items with four option responses. Total scores range from 20-80 with higher scores suggestive of greater anxiety (Spielberger, Gorsuch & Lushene, 1970). High concurrent validity between the STAI-T and other anxiety scales has been reported (Spielberger & Vagg, 1995), with good test-retest reliability for correlations of trait and state anxiety ($r = .86$ and $.54$ respectively) (Spielberger, Gorsuch & Lushene, 1970). Rule & Traver (1983) evaluated the test-retest reliability of state and trait anxiety in a non-clinical sample, before and after participants' exposure to an analogue stressor. The authors' findings supported results of previous studies in which state anxiety increased from test to retest, whilst trait anxiety remained at similar levels (Rule & Traver, 1983; Tilton, 2008).

The STAI-T was given prior to the first testing session to assess the extent to which each participant reported *generally* experiencing anxious responses. The STAI-S was administered at the start of both testing sessions and adapted to ask specifically about feelings of anxiety over the last week, paralleling the instructions of the CES-D Scale. This was to allow exploration of pre- and post- between-group differences following the extended week-long manipulation.

2.6.5 Center for Epidemiological Studies Depression Scale (CES-D Scale; Radloff, 1977)

The CES-D is a 20-item self-report questionnaire designed to assess depressive symptoms in the general population. Participants are required to answer each item according to frequency of occurrence over the past week, ranging from '*Rarely or None of the time (Less than 1 Day)*' to '*Most or All of the time (5-7 Days)*'. Scoring ranges from 0-60, with higher scores indicative of a greater degree of depressive mood. In the general population, the CES-D has

been found to have high internal consistency ($\alpha = .85$) and test-retest reliability around $r = .51$ following a two-week interval, as would be expected given its emphasis on current symptomatology (Radloff, 1977). As with the STAI-S, the CES-D was given at the start of Session 1 and 2 to assess low mood over the preceding week.

2.6.6 General Information Questionnaire [unpublished]

This questionnaire was designed to obtain key demographic information about participants. Participants were asked to provide information about their age, gender, ethnic background, first language, marital status, educational background and employment status. Additionally, further items assessing previous and/or current medical experience; average time per month spent watching medical television programs; and driving frequency were included. Any history of traumatic experiences, including road traffic accidents, had been previously identified during the screening telephone call.

2.6.7 Psychoactive Screen [unpublished]

Due to the reliance on heart-rate data in this study, participants were asked to record any consumption of caffeine, cigarettes and prescribed medication over the two hours prior to each testing session. The consumption and quantity of alcohol and drugs (illicit or prescribed) in the 24-hours prior to each session was also assessed.

2.6.8 Positive and Negative Affect Scale-Expanded Form (PANAS-X; Watson & Clark, 1994)

The PANAS-X is a 60-item measure of self-rated affect assessing 11 specific mood states: Fear, Sadness, Guilt, Hostility, Shyness, Fatigue, Surprise, Joviality, Self-Assurance, Attentiveness, and Serenity. For research purposes, or where time constraints may apply, relevant subscales can be administered independently (Watson & Clark, 1994). Four subscales of the PANAS-X were selected for consistent administration in this study: Fear, Sadness (as indicators of negative affect), Joviality and Serenity (as indicators of positive affect and/or arousal). This comprised a total of 22 items. During the course of sessions, participants were asked to rate each item on a 5-point scale according to how they felt at that particular point (instruction: '*right now*').

In an undergraduate population, the two higher order scales Positive Affect and Negative Affect have been found to have high internal reliability ($\alpha = .87$ to $.89$ for Positive Affect; $\alpha = .84$ to $.89$ for Negative Affect; Watson & Clark, 1994) and high validity (Krohne et al.,

1996). Additionally, each of the four subscales selected for administration in this study have been found to have high internal reliability (Fear: median internal consistency estimate of .87; Sadness: median $\alpha = .87$; Joviality: median $\alpha = .93$; Serenity: median $\alpha = .76$), and did not vary systematically with the rated time-frame given (Watson & Clark, 1994). It was reported by the authors that the lower internal consistency observed in the Serenity scale is likely to be a reflection of the fact that it has relatively few items. The PANAS-X scales have also shown high convergent correlations with other measures of short-term state affect, such as the Profile of Mood States (POMS; McNair, Lorr & Droppleman, 1971), yet with better discriminant validity (Watson & Clark, 1994).

2.6.9 Self-Assessment Manikin (SAM; Lang, 1980)

The SAM affective rating system uses non-verbal graphic representations to assess the three dimensions of valence, arousal and dominance. The graphic figures depict variations in emotional reactions on each dimension using a 9-point scale. Participants are instructed to rate their mood at that particular moment by placing a cross either in or between the corresponding figure(s). Ratings are scored such that '9' represents a high rating on each dimension (i.e. high pleasure, high arousal, high dominance) with '1' representing a low rating. In this study, only the valence and arousal dimensions were selected as relevant for inclusion, and were administered in the pencil-and-paper format of this instrument to remain consistent with other measures given. The SAM instrument has shown good reliability and validity when used in the development of the International Affective Picture Scale (IAPS; Lang, Bradley & Cuthbert, 2005).

The SAM system was used in addition to the PANAS-X, due to the need for a brief mood and subjective arousal measure at points when the PANAS-X might have proved too lengthy and/or disruptive to the experimental procedure (for example, immediately post-manipulation, yet prior to the two-minute break where intrusions were to be monitored).

2.6.10 Intrusions Questionnaire [unpublished]

Intrusive memories of the video were assessed with an adapted version of the Intrusive Memory Questionnaire (IMQ; Michael & Ehlers, 2007). With reference to the prior 2-minute interval, participants were asked to rate the proportion of time spent dwelling on the video; to estimate the number of images experienced; and to provide distress ratings on a '0' (*'not at all distressing'*) to '100' (*'extremely distressing'*) visual analogue scales for both thoughts and images experienced.

2.6.11 Daily Diary [unpublished]

The Daily Diary consisted of an adapted Intrusions Questionnaire for each day, subdivided into three sections for completion at differing time-points: estimations of the frequency of intrusions during the daily ten-minute task; during the first half of the day (until midday); and intrusions occurring in the second half of the day (afternoon and evening). Additional items rated on a 0-100 visual analogue scale assessed the distress associated with images occurring during each of these time-frames (0 = *'not at all'* to 100 = *'very much'*).

2.6.12 Concerns about Accidents Questionnaire [CAQ; unpublished]

The CAQ was used to identify specific themes in participants' thoughts following exposure to the trauma film, and was adapted from an earlier version of the 'Diagnostic Questionnaire for the Rumination Condition' developed by Zetsche, Ehling & Ehlers (2009). Participants were given a list of commonly occurring thoughts whilst watching the video and were asked to rate on a 10-point scale the extent to which each item applied to them (ranging from *'Does not apply at all'* to *'Applies very much'*). Responses were then used to provide those participants in the rumination condition with sentences directly relating to the themes indicated to be of increased personal relevance, in order to increase the likelihood of task adherence. Each of the 14-items corresponded to 14 distinct 'rumination' themes, for example: *'perceived danger'*; *'relating video to own life'*; *'guilt'* (see also section 2.7.4.1 *Experimental (rumination condition)* below). Internal consistency was therefore not calculable given that each of the items were intended to represent distinct themes, rather than any cluster of items aiming to measure an underlying construct.

2.6.13 Manipulation Checks

Visual analogue scales (VAS) were used as manipulation checks at relevant points in the procedure. Two items were given following exposure to the trauma film: on the *Attention VAS*, participants rated their ability to focus their attention on the video (0 = *'not at all able'* to 100 = *'completely able'*); on the *Unpleasantness VAS*, participants were asked to rate how unpleasant they found the video footage (0 = *'not at all unpleasant'* to 100 = *'extremely unpleasant'*).

A single item, the *Task VAS*, was administered to both rumination and control conditions following the experimental manipulation in Session 1. Participants were asked to rate the proportion of time they had spent dwelling on accidents during the task (0 = *'none of the time'* to 100 = *'all of the time'*).

At the beginning of Session 2, participants completed the Manipulation Check Questionnaire (MCQ). The MCQ consisted of five items: the first assessed participants' ability to carry out the daily tasks over the week; 3-items assessed the care taken over diary completion; and one item assessed the proportion of time spent dwelling on accidents during the daily tasks. All items were rated on a 0-100 scale (0 = '*never*' to 100 = '*always*'). Participants in the rumination condition completed an additional sixth item, assessing the personal relevance of the rumination sentences given to them (0 = '*never*' to 100 = '*always*').

2.7 Materials and Tasks

2.7.1 Trauma video

The trauma video used in this study depicted real life footage of road traffic accidents (including dead bodies, injured people and the administration of medical treatment by paramedics). The film had been adapted from the original German video developed by Steil (1997), to include footage shot in the UK. It has been widely used in previous studies both in its original and current format (cf. Zetsche, Ehring & Ehlers, 2009; Ehlers et al., 2010). The video lasted 17 minutes 30 seconds and was presented to participants on a 93 x 70cm TV screen. Participants were seated approximately 2m from the screen.

2.7.2 Physiological apparatus and recording

Heart-rate response as an index of physiological arousal was selected due to evidence that this measure is particularly sensitive in distinguishing between trauma survivors with and without PTSD (Pole, 2007); as such it was hoped this increased sensitivity would be most appropriate for use within a non-clinical sample, where any changes in arousal may be less obvious.

Heart-rate and respiratory responses were recorded continuously using the Varioport bio-signal recording device (VitaPort system, Becker Meditec). Electrocardiogram (ECG) electrodes were placed on the manubrium sterni and the left and right lower ribcage to measure heart-rate, and recorded with a sampling rate of 256 Hz. A continuous measure of respiration was obtained using a Pneumotrace II transducer which was attached around the participant's upper chest: this allowed for possible respiration artifacts (e.g. sighs or coughs) to be identified. All apparatus had been used previously in other studies, in conjunction with the picture task (Ehlers et al., 2010; Suendermann et al., 2010). Heart-rate data in which there were indications of problematic recording were excluded from analysis, e.g. too poor

quality to analyze; irregular heart-rate; too frequent breathing artifacts or extra systoles. A software package was developed to analyze the physiological data (Stott, 2012).

2.7.3 MP3 players

All participants were given a Sweex MP300 2GB Clipz MP3 player to complete the daily ten-minute rumination/ distraction induction between sessions. Pre-recorded tasks relevant to each participant's experimental allocation were uploaded onto the MP3 player during the first session. This ensured tasks could administered in a standardized format at home during the week. A manipulation check (codeword) was built into the end of each day's recording to heighten task compliance. Participants were asked to record all codewords in the Daily Diary.

2.7.4 Post-video processing manipulation

Participants were randomly allocated to either an experimental (rumination) or control (distraction) post-video processing manipulation, using a simple randomization procedure stratified by gender. Both conditions required participants to undertake a ten-minute thinking exercise in Session 1 and each day over the proceeding week, following audio pre-recorded task instructions. For task completion in Session 1, audio instructions were played via the TV whilst the screen remained blank. For task completion between sessions, participants were asked to follow each day's pre-recorded instructions on their MP3 player. Task content varied between conditions as outlined below.

2.7.4.1 Experimental (rumination) condition

This condition aimed to induce rumination about the video. Participants were told that they would hear a series of sentences and/or questions presented over the subsequent ten-minute period. They were instructed to dwell on each sentence and its implications; to think it through as much as possible in their mind; and to allow their thoughts to drift to related thoughts or issues. If participants found themselves dwelling on totally unrelated topics, they were asked to try to bring their attention back to the last sentence given. In Session 1, each participant was presented with sentences and questions from their highest scoring theme on the CAQ. Questions from each participant's three highest scoring themes were uploaded onto MP3 players for the week; each theme repeated once over the week (participants in this condition therefore listened to Theme A, B, C, A, B, C on Days 1-6 respectively). It was hoped that selection of pre-identified personally relevant themes would increase task adherence.

Ruminative sentences used in a previous rumination induction study (Zetsche, Ehring & Ehlers, 2009) were selected for administration. All sentences were designed to include the characteristic dimensions of ruminative thinking: unproductiveness and circularity ('particularly 'why?' or 'what if' questions), catastrophizing, repetitiveness and abstractness (cf. Nolen-Hoeksema, 1991; Michael et al., 2007; Watkins, 2008). All items presented to participants had been previously rated as highly representative in form and content of those ruminative thoughts reported by RTA survivors with PTSD, by eight therapists specialized in the cognitive-behavioral treatment of PTSD (Zetsche, Ehring & Ehlers, 2009).

Fourteen rumination themes with a total of 72 sentences were audio-recorded, with a possible three to seven sentences within each theme. Themes included, among others: 'relating video to own life' (e.g. *'What if an accident like that happened to my loved ones?'*); 'anger about reckless driving' (e.g. *'Why do people have to drive that recklessly?'*); and 'the perspective of a victim' (e.g. *'How much pain must have the injured people have experienced!'*). Depending on the theme, each sentence was presented at 1 min 25 sec to 3 min 20 sec intervals within the ten-minute task.

2.7.4.2 Control (distraction) condition

The control condition aimed to distract participants from thinking about the video to ensure rumination did not occur, and was designed to parallel the concentration and verbal activity required by the rumination group. Participants were informed that the tasks constituted a series of thought-training exercises. Tasks were presented in the form of 'word games', with three brief exercises comprising each ten-minute task. Exercises included, among others: listing a series of words starting with the same target letter (e.g. Target Letters: 'G', 'S', 'P'); word-association tasks (e.g. 'cat' – *mouse*; birthday – *party*); guesses at target acronyms presented (e.g. Target Acronyms: 'BAM', 'TFL'); sentence completion using target words presented (e.g. Target Words = tent, dog, drink = 'The dog was having a drink next to the tent').

As with the rumination group, participants were instructed to focus their attention on the audio-instructions given and to complete all tasks in their head. If they found their attention wandering, subjects were asked to pick up the task again as soon as possible, returning to the last item presented. To ensure motivation was maintained, participants were reassured that

the tasks were designed to be hard, and where applicable, that there were no right or wrong answers.

Each ten-minute task constituted three ‘word game’ exercises. 18 content-distinct exercises were therefore developed to cover Days 1-6, each lasting 3 minutes 20 seconds. All participants in the control condition received the same combination of three tasks in Session 1 and each day over the week (Day 1 (*exercises 1, 2, 3*); Day 2 (*exercises 4, 5, 6*); and so on). The control task given in Session 1 was the same as administered on Day 6.

2.7.5 Picture-viewing task

All participants were required to undertake a picture-viewing task in Session 2. The task had been used in its current format in previous research with a clinical sample of trauma survivors (Ehlers et al., 2010; Suendermann et al., 2010). Pictures included in the task had been drawn from the International Affective Picture System (Lang, Bradley & Cuthbert, 2005) and from the pictures used by Elsesser, Sartory & Tackenberg (2004), and others had been piloted on 39 health volunteers to determine appropriate categorization (Ehlers et al., 2010). During presentation of the pictures, participants’ heart-rate was monitored continuously.

In total, a series of 38 pictures were presented in a pseudorandom order. These comprised: 14 ‘trauma-related’ pictures, relating specifically to RTAs (e.g. collision of car and motorbike; crashed bicycle); 12 ‘generally threatening’ pictures (e.g. spider on shoulder; skulls piled up); and 12 ‘neutral’ pictures (e.g. ice cream kiosk; business meeting). Consecutive presentation of pictures from the same category was avoided to minimize habituation effects. Each picture was presented for 6 seconds on a laptop (screen size 15.4”) situated approximately 0.5 m away from the participant. Intervals between picture presentation varied randomly between 9 - 13 seconds.

Participants were informed that the purpose of the task was to measure bodily responses to pictures. They were therefore asked to consider each picture carefully, and to move as little as possible during the task.

2.8 Procedure

One week prior to the first testing session, participants were emailed a trait questionnaire package, including the PTQ-T, RSQ, STAI-T and PSWQ. They were asked to bring the completed questionnaires with them to the first session.

On arrival at Session 1, participants were given the opportunity to ask further questions about the study and informed consent was sought. Participants were attached to equipment measuring heart-rate and respiratory responses for the duration of the session. For this purpose, participants were asked to move and to talk as little as possible throughout testing. Markers were used to delineate periods of particular interest for heart-rate analyses; for example, the researcher pressed a marker immediately before and after the trauma video, and either side of baseline measurements. A psychoactive screen was completed by participants to assess any caffeine, alcohol or drug consumption prior to the session, in case of adverse effects on the physiological data.

Participants completed state mood measures assessing current symptoms of low mood and anxiety (CES-D and STAI-S). As part of an associated study, a battery of neuropsychological tests was administered at this point (including the WTAR, Hayling and Brixton, Letter-Number Sequencing and a Random Number Generation task). Assessment lasted approximately 20-30 minutes, with some individual variation.

Following these tests, an initial baseline heart-rate measurement (Baseline 1) was taken over a 3-minute period and baseline measures of mood were given (PANAS-X 1; SAM valence and arousal 1). Participants were then asked to concentrate their attention on the trauma video, being explicitly informed that the film depicted real footage from RTAs. Following exposure to the video, participants completed an immediate brief measure of mood (SAM valence and arousal 2) prior to a two-minute break, serving as a spontaneous rumination phase. After this interval, participants were asked to complete the IMQ (retrospectively reporting the number of intrusions experienced during the two-minutes); the PTQ-S (indicating degree of naturally-occurring rumination during this period); and repeated mood scales (PANAS-X 2; SAM valence and arousal 3). Manipulation checks assessing the perceived unpleasantness of the video (*Unpleasantness VAS*) and degree to which participants had been able to concentrate on the footage (*Attention VAS*) were also given. The CAQ was also administered in order to assess the themes of naturally-occurring thoughts during the video.

Participants then completed two brief tasks relevant to the associated study: a 2-minute rumination task, in which participants were asked to dwell on the video content, and a 2-minute rumination cessation task, in which participants were asked to turn their attention to an alternative stimulus. A five-minute break followed, in which each participant was engaged in conversation with the researcher. The break provided an opportunity for the researcher to prepare the relevant MP3 materials for the extended week-long manipulation, as well as serving a means to ensure any rumination prompted by these tasks was sufficiently halted.

A second baseline heart-rate measurement was taken (Baseline 2). All participants completed further mood measures (PANAS-X 3; SAM valence and arousal 4) prior to the experimental manipulation. Participants were allocated to either the 'rumination' or 'control' condition, using a simple randomization procedure stratified by gender. They were not informed of their allocated condition at this time. Both rumination and control tasks lasted ten minutes in total. Instructions specific to each task were given.

For the rumination task, participants were informed they would hear a series of sentences about accidents, presented at predetermined intervals (see details of tasks above). Participants were asked to dwell on each sentence for as long as possible, thinking it through fully in their mind. To increase the likelihood of rumination, the sets of sentences presented corresponded to each participant's highest scoring theme on the CAQ. It was hoped this would make the rumination induction as personally relevant as possible. In the control task, participants were presented with a series of verbal tasks to complete (see details of tasks administered above). Participants were informed they were to complete a series of thought-training exercises, similar in style to the battery of neuropsychological tasks completed at the beginning of the session. They were asked to complete these exercises in their head, to parallel the verbal activity of the rumination group. All participants in the control condition received the same tasks for completion.

Immediately after the experimental manipulation, participants completed a further brief measure of mood (SAM valence and arousal 5) prior to a second two-minute spontaneous rumination phase. Following this brief break, participants completed the IMQ (2), PTQ-S (2), PANAS-X (4) and SAM valence and arousal (6). Manipulation checks assessing degree of task adherence was also given.

Instructions regarding the extended week-long task, how to operate the MP3 players, and completion of Daily Diary were given. Completion of the task in-session as well as over the week ensured understanding of these 'homework' exercises.

Participants returned for Session 2 exactly one week later, and their data from the week and all equipment was collected. Repeat CES-D and STAI-S questionnaires were administered to assess any change in low mood or anxiety over the week. Participants were again attached to equipment measuring heart-rate and respiratory responses, before completing the picture-task.

At the end of the second session, participants received £40 payment for their inclusion in the study. A full debrief of the aims of the study was offered, and participants were informed of their prior allocation to the experimental or control condition. All participants were given the opportunity to discuss the trauma video or task content if they wished. No participant reported distress or adverse effects from exposure to the video.

Finally, it should be noted that this project was conceptualised and developed in conjunction with an associated study, brief details of which have been outlined above. Particular consideration and attention was given to minimising potential contamination effects between studies - and task demand - within the stages of procedural design. In particular, the neuropsychological assessment required by the associated study was incorporated at the beginning of the initial testing session - and prior to exposure to the trauma analogue - in order to prevent disruption to the current study's key aims. The additional 2-minute rumination task and 2-minute cessation task administered after the trauma film were considered brief enough to minimize the likelihood of disruption between exposure to the trauma analogue and the main experimental tasks of this study. The inclusion of a 5-minute break was also incorporated into the overall study design in order to ensure participants had indeed ceased any rumination engendered by these brief tasks, and repeat baseline measures pertaining to this study (as outlined above) served as additional manipulation checks. As such, although the risk of these extra tasks impacting on the current study is acknowledged, this was considered unlikely given consideration of the above factors within procedure design.

2.9 Ethical Consideration

This project was given ethical approval by Kings College London Research Ethics Committee (ref: PNM/10/11-47). The letter confirming ethical approval is included in Appendix B.

2.10 Statistical Analyses

All analyses were conducted using the Statistical Package for the Social Sciences 17.0 (SPSS Institute, Chicago, IL, USA). In order to assess normality of data distributions, the Kolmogorov-Smirnov test was considered alongside visual inspection, and data transformed where appropriate using log or square root transformations. As parametric tests are robust to some degree of deviation from the standard distribution (Gravetter & Wallnau, 2000), in cases of small deviations from normality, parametric statistics were preferred due to the increased power over their non-parametric counterparts. In cases where transformation failed to adequately reduce skewness, non-parametric analysis was used. Homogeneity of variance was considered using Levene's test. Box's M was used to assess that assumptions regarding homogeneity of inter-correlation had not been violated, when mixed analysis of variance (ANOVA) models had been applied, with an alpha significance of 0.01 due to the highly sensitive nature of this test (Pallant, 2010). Where sphericity assumptions within mixed ANOVAs had been violated, the Greenhouse-Geisser correction for repeated measures is reported.

Given that gender differences had been indicated in previous studies (Zetsche, Ehring & Ehlers, 2009), further exploratory analyses was run incorporating sex as an additional between-group factor for all of the main hypotheses.

Where chance between-group differences at baseline were indicated, Pearson's or Spearman's rank correlation co-efficient were used to examine the extent of the association with the dependent variable; only if significant were these added to analyses as covariates. This was to reduce the chance of Type 1 error resulting from unnecessary additional multiple comparisons.

With respect to the heart-rate data, R-intervals were converted into heart-rate (in beats per minute) and analyzed using a program developed by Richard Stott (Stott, 2012). An a-priori significance level of $\alpha < 0.05$ (two-tailed) was used for all statistical tests.

Effect sizes for analysis of variance models were computed using partial eta squared (η^2) as recommended by Rosenthal & Rosnow (1991). Effect sizes for t-tests and non-parametric tests were reported using Cohen's d by which effects are classified as small ($d = 0.2$), medium ($d = 0.5$) and large ($d = 0.8$) (Cohen, 1988).

3. RESULTS

3.1 Demographics and baseline measurements

Despite randomization to experimental and control conditions, chance between-group differences on certain demographic variables were observed (cf. age and previous clinical experience in a medical setting). The impact of these variables was further investigated in examination of the main hypotheses. There were no differences observed between groups on trait measures of rumination and anxiety, or baseline state measures of depression and anxiety. Table 1 highlights the sample characteristics by condition, and provides the results of the between-group statistical analysis.

Table 1: Sample Characteristics

		Group		Statistical Analysis
		Ruminators M (SD) or N (%)	Controls M (SD) or N (%)	
Age		25.23 (5.80)	22.46 (4.14)	$t(80) = -2.50$, $p = 0.02^*$
Sex	Female	32 (78.0%)	32 (78.0%)	$\chi^2(1, n = 82) = 0.00$, $p = 1.00$
	Male	9 (22.0%)	9 (22.0%)	
Ethnic background	Caucasian	33 (80.5%)	35 (85.3%)	$\chi^2(1, n = 82) = 0.09$, $p = 0.78$
	Other	8 (19.5%)	6 (14.6%)	
Frequency of driving	Never	21 (51.2%)	20 (48.8%)	$\chi^2(2, n = 82) = 2.09$, $p = 0.35$
	<5 times/ month	11 (26.8%)	16 (39.0%)	
	>5 times/ month	9 (22.0%)	5 (12.2%)	
Previous clinical experience in a medical setting	Yes	16 (39.0%)	7 (17.1%)	$\chi^2(1, n = 82) =$, $p = 0.05^*$
	No	25 (61.0%)	34 (82.9%)	
Hours watching medical TV/ month		3.83 (4.88)	4.80 (5.37)	$t(80) = 0.86$, $p = 0.39$
Trait Rumination (PTQ-T)		22.63 (9.91)	24.20 (10.89)	$t(80) = 0.68$, $p = 0.50$
Trait Rumination (RSQ)		19.29 (5.08)	19.75 (5.86)	$t(80) = 0.38$, $p = 0.71$
Trait Anxiety (STAI-T)		38.85 (8.53)	40.76 (10.47)	$t(80) = 0.91$, $p = 0.37$
Trait Worry (PSWQ)		44.53 (12.84)	45.61 (12.50)	$t(80) = 0.39$, $p = 0.70$
Depression (CES-D 1)		8.71 (7.33)	10.59 (7.31)	$t(80) = 1.16$, $p = 0.25$
Anxiety (STAI-S 1)		37.20 (9.01)	41.09 (9.50)	$t(79) = 1.89$, $p = 0.06$

PTQ = Perseverative Thinking Questionnaire; RSQ = Response Style Questionnaire; STAI-T = State-Trait Anxiety Inventory – Trait version; PSWQ = Penn State Worry Questionnaire; CES-D = Center for Epidemiological Studies - Depression Scale; STAI-S = State-Trait Anxiety Inventory – State version; * = Statistically significant at $p < 0.05$

3.2 Manipulation checks

3.2.1 Video ratings of attention and unpleasantness

On average, participants reported high levels of attention during presentation of the trauma film ($M = 83.05$, $SD = 11.56$, range = 50-100) on a 0-100 scale (*Attention VAS*). There was no significant difference between mean ratings of attention for rumination ($M = 84.88$, $SD = 10.87$) and control ($M = 81.22$, $SD = 12.08$) conditions ($t(80) = -1.44$, $p = .15$, $d = 0.32$).

On average, participants rated the trauma video as moderately unpleasant ($M = 65.98$, $SD = 19.6$, range = 10 - 100) on a 0-100 scale (*Unpleasantness VAS*); by chance there was a significant statistical difference observed between groups with the experimental group, on average, rating the video as more highly unpleasant than the controls ($M = 70.73$, $SD = 18.22$; $M = 61.22$ and $SD = 20.02$ respectively; $t(80) = -2.25$, $p = .02$, $d = 0.50$). This initial unpleasantness rating was therefore controlled for in all relevant subsequent analysis of the main hypotheses.

3.2.2 Effect of video on mood

In order to assess the effect of the trauma film on mood, PANAS-X ratings were obtained pre- and post- video (Table 2). A mixed between-within subjects analysis of variance (ANOVA) was conducted. Exposure to the trauma video did indicate a significant effect of ‘time’, with increases in participants’ ratings of fear ($F(1, 80) = 7.47$, $p = .01$, $\eta^2 = .09$) and sadness ($F(1, 80) = 131.91$, $p < .01$, $\eta^2 = .62$), and a decrease in reported joviality ($F(1, 80) = 282.28$, $p = .00$, $\eta^2 = .78$). There was no main effect of ‘condition’ for fear ($F(1, 80) = 0.01$, $p = .93$, $\eta^2 = .09$), sadness ($F(1, 80) = 0.07$, $p = .79$, $\eta^2 = .00$) or joviality ($F(1, 80) = 2.76$, $p = .10$, $\eta^2 = .03$). There was no significant ‘time x condition’ interaction found for fear ($F(1, 80) = 1.83$, $p = .18$, $\eta^2 = .02$), sadness ($F(1, 80) = 0.09$, $p = .76$, $\eta^2 = .00$), or joviality ($F(1, 80) = 0.02$, $p = .88$, $\eta^2 = .00$), indicating that participants in both conditions experienced similar increases in negative affect and a decrease in positive affect.

Similar findings were replicated on the SAM-scales for valence, with a main effect for ‘time’ both immediately following the video ($F(1, 80) = 238.7$, $p < .01$, $\eta^2 = .75$), and after the two-minute spontaneous rumination phase ($F(1, 80) = 173.7$, $p < .01$, $\eta^2 = .69$). Again, no significant main effect of ‘condition’ (immediately post-video: $F(1, 80) = 2.28$, $p = .14$, $\eta^2 = .03$; post-spontaneous rumination phase: $F(1, 80) = 1.01$, $p = .34$, $\eta^2 = .01$) or ‘time x condition’ interactions were found (immediately post-video: $F(1, 80) = 0.92$, $p = .34$, $\eta^2 =$

.01; post-spontaneous rumination phase: $F(1, 80) = 3.38, p = .07, \eta^2 = .04$), indicating both groups to have experienced a similar decrease in positive mood.

Table 2: Effect of video on dependent variables: means and standard deviations by condition

		Group		
		Total M (SD)	Ruminators M (SD)	Controls M (SD)
Attention VAS		83.05 (11.56)	84.88 (10.87)	81.22 (12.08)
Unpleasantness VAS		65.98 (19.6)	70.73 (18.22)	61.22 (20.02)
PANAS-X Fear	Pre- video	8.20 (2.76)	8.49 (3.37)	7.90 (1.98)
	Post- 2 min break	9.26 (4.05)	9.02 (4.63)	9.49 (3.39)
PANAS-X Sadness	Pre-video	5.68 (2.26)	5.56 (1.99)	5.80 (2.52)
	Post- 2 min break	9.34 (3.32)	9.32 (3.37)	9.37 (3.30)
PANAS-X Joviality	Pre-video	21.33 (5.91)	22.22 (5.48)	20.44 (6.27)
	Post- 2 min break	12.07 (4.56)	12.88 (5.11)	11.27 (3.83)
PANAS-X Serenity	Pre-video	7.82 (1.55)	7.68 (1.62)	7.95 (1.48)
	Post- 2 min break	8.30 (2.57)	8.34 (2.69)	8.27 (2.47)
SAM valence	Pre-video	6.61 (1.36)	6.88 (1.16)	6.34 (1.49)
	Immediately post-video	3.85 (1.38)	3.95 (1.50)	3.76 (1.26)
	Post- 2min break	4.51 (1.28)	4.49 (1.42)	4.54 (1.14)
SAM arousal	Pre-video	4.21 (1.71)	4.49 (1.79)	3.93 (1.59)
	Immediately post-video	4.67 (1.72)	4.80 (1.71)	4.54 (1.73)
	Post- 2-min break	3.63 (1.60)	3.71 (1.72)	3.56 (1.48)
Mean HR	Baseline	67.06 (11.28)	65.65 (10.59)	68.44 (11.89)
	Trauma film	68.13 (11.38)	66.78 (10.42)	69.49 (21.25)
PTQ-S post-video		23.80 (14.30)	24.83 (13.84)	22.78 (14.85)
Number of images post-video		4.37 (5.82)	3.83 (3.37)	4.90 (7.53)

M = mean, SD = standard deviation

3.2.3 Effect of video on heart-rate response

Heart-rate responses to the trauma video were assessed to provide an objective measure of physiological arousal, prior to the experimental manipulation. The overall mean heart-rate response during i) the pre-video baseline and ii) presentation of the video were used. Mean baseline heart-rates did not differ significantly between the control ($M = 68.44$, $SD = 11.89$) and rumination ($M = 65.65$, $SD = 10.59$) groups ($t(79) = 1.11$, $p = .27$, $d = 0.25$). Unexpectedly, a main effect of ‘time’ was not found although trend level significance was indicated ($F(1, 78) = 3.05$, $p = .08$, $\eta^2 = .04$). No significant main effect for ‘condition’ ($F(1, 78) = 1.35$, $p = .25$, $\eta^2 = .02$) or ‘time x condition’ interactions ($F(1, 78) = 0.08$, $p = .78$, $\eta^2 = .00$) suggested to be true for both groups.

Further consideration of heart-rate response to the video suggested habituation effects. When the heart-rate data over the first half of the video only were compared against the corresponding baseline measurement, a significant increase in physiological arousal was observed (‘time’: $F(1, 79) = 6.27$, $p = .01$, $\eta^2 = .07$) regardless of group (‘condition’: $F(1, 79) = 1.01$, $p = .32$, $\eta^2 = .01$; ‘time x condition’: $F(1, 79) = 0.81$, $p = .37$, $\eta^2 = .01$). Mean heart-rate over the second half of the video indicated no main effect of ‘time’ ($F(1, 79) = 0.70$, $p = .40$, $\eta^2 = .01$), ‘condition’ ($F(1, 79) = 0.79$, $p = .38$, $\eta^2 = .01$), or ‘time x condition’ interactions ($F(1, 79) = 0.03$, $p = .86$, $\eta^2 = .00$). The fact that the increase in physiological arousal disappeared when the video as a whole was considered suggests that participants may have become desensitized to the footage presented as time progressed.

Self-reported arousal on the SAM-scale indicated a main effect of ‘time’ ($F(1, 80) = 6.60$, $p = .01$, $\eta^2 = .08$) with participants reporting a subjective increase in physiological arousal immediately post-video. As expected, no main effect of ‘condition’ ($F(1, 80) = 1.37$, $p = .25$, $\eta^2 = .02$) or ‘time x condition’ interaction ($F(1, 80) = 0.32$, $p = .58$, $\eta^2 = .00$) was observed.

3.2.4 Effect of video on the two-minute spontaneous rumination phase

On average, participants reported low to moderate levels of naturally occurring rumination in the two-minute spontaneous rumination phase following the trauma film on the PTQ-S ($M = 23.80$, $SD = 14.30$, range = 0 - 56). There was no significant difference between mean ratings of rumination for control ($M = 22.78$, $SD = 14.85$) and rumination ($M = 24.83$, $SD = 13.83$) conditions ($t(80) = -0.65$, $p = .52$, $d = -0.14$). Additionally, there was no significant difference between the number of images experienced by the rumination ($M = 3.83$, $SD =$

3.39) vs. control group ($M = 4.9$, $SD = 7.52$; $t(80) = -5.33$, $p = .60$, $d = -0.18$) in this two-minute period following the video.

On the PANAS-X serenity scale, comparing pre-video and post-spontaneous rumination phase scores, there was a significant main effect of ‘time’ ($F(1, 80) = 3.84$, $p = .05$, $\eta^2 = .05$) indicating an unexpected *increase* in serenity reported by participants. No significant main effect for ‘condition’ ($F(1, 80) = 0.06$, $p = .80$, $\eta^2 = .00$) or ‘time x condition’ interaction ($F(1, 80) = 0.47$, $p = .50$, $\eta^2 = .01$) was observed. Similarly, despite the increase in self-reported arousal on the SAM-scale immediately post-video, a significant *decrease* in self-reported arousal was found in a comparison of the pre-video to post-spontaneous rumination phase scores (‘time’: $F(1, 80) = 7.39$, $p = .01$, $\eta^2 = 0.09$). Again, there were no significant main effect of ‘condition’ ($F(1, 80) = 0.77$, $p = .38$, $\eta^2 = .01$) or ‘time x condition’ interactions ($F(1, 80) = 0.90$, $p = .35$, $\eta^2 = .01$).

Following the objective (HR response) and subjective (SAM-arousal score) increase in arousal observed during, and immediately following, exposure to the trauma video, the findings above suggest a subsequent decrease in arousal to have occurred during the two-minute naturalistic monitoring period, for both groups of participants.

3.2.5 Experimental manipulation in Session 1

A manipulation check (*Task VAS*) assessing the proportion of time participants spent dwelling on events in the video footage was administered immediately following the experimental manipulation. As expected, participants in the rumination condition ($M = 58.66$, $SD = 24.47$, range = 0 - 90) reported spending a significantly higher proportion of time dwelling on the video or related topics than the control condition ($M = 5.49$, $SD = 8.35$, range = 0 – 30; $t(49.1) = -13.17$, $p < .01$, $d = 2.91$).

3.2.6 Experimental manipulation: Extended week-long task

The manipulation check questionnaire (MCQ) was given at the start of Session 2 to assess to task compliance over the week. On average, participants reported high task compliance: this can be seen in Table 3 below. In particular, both groups reported being able to carry out the daily tasks over the week as instructed ($M = 90.30$, $SD = 11.20$) with no difference between rumination ($M = 91.59$, $SD = 10.27$) and control ($M = 89.02$, $SD = 12.05$) conditions on an Independent Samples Mann-Whitney U Test ($U = 745$, $z = -0.94$, $p = .35$). As expected, participants in the rumination condition ($M = 54.88$, $SD = 25.70$) reported greater in-task

dwelling than controls ($M = 23.29$, $SD = 21.73$) on a 0-100 scale ($U = 300.5$, $z = -5.04$, $p < .01$, $d = 1.33$). However, despite the administration of individually-tailored rumination themes, on average, participants rated these as low in personal relevance ($M = 35.7$, $SD = 24.07$).

Table 3: Results of MCQ by group

	Group			Statistical Analysis
	Total M (SD)	Ruminators M (SD)	Controls M (SD)	
Able to carry out daily task	90.30 (11.20)	91.59 (10.27)	89.02 (12.05)	$U = 745$, $z = -0.94$, $p = 0.35$
Unable (or forgotten) to record memories	7.93 (15.7)	6.59 (11.8)	9.27 (18.89)	$U = 825.5$, $z = -0.16$, $p = 0.87$
Taken care over daily diary	88.84 (12.12)	89.27 (11.27)	88.41 (13.05)	$U = 836.5$, $z = -0.39$, $p = 0.97$
Recorded memories on different day	2.32 (5.45)	1.59 (3.61)	3.05 (6.79)	$U = 789.5$, $z = -0.69$, $p = 0.49$
Dwelling on events from video (or related topics)	-	54.88 (25.70)	23.29 (21.73)	$U = 300.5$, $z = -5.04$, $p = 0.00^*$
Personal relevance of topics	–	35.7 (24.07)	–	–

MCQ = Manipulation Check Questionnaire

3.3 Tests of Main Hypotheses

3.3.1 Effect of the experimental manipulation on mood

Hypothesis 1: Participants in the rumination condition will report greater increases in low mood and anxiety at Session 2 than participants in the control condition.

Participants completed the STAI-S and CES-D at the start of both testing sessions, to give an indication of any change in affect occurring over the week. One participant failed to complete the STAI-S at session 2 (rumination condition) and as such this data is missing from analysis. Means and standard deviations of scores obtained are shown for both groups below (Table 4). A mixed between-within subject ANOVA was conducted to assess the impact of the experimental manipulation (rumination task vs. control distraction task) over the week on mood questionnaire scores.

Table 4: Means and standard distribution of CES-D and STAI-S scores

		Group		
		Total M (SD)	Ruminators M (SD)	Controls M (SD)
CES-D	Session 1	9.65 (7.34)	8.71 (7.33)	10.59 (7.31)
	Session 2	10.04 (7.19)	10.44 (8.15)	9.63 (6.16)
STAI-S	Session 1	39.17 (9.41)	37.20 (9.01)	41.09 (9.50)
	Session 2	39.23 (8.56)	39.33* (9.23)	39.13 (7.96)

* = missing data from n=1

On the STAI-S, neither a main effect for ‘time’ ($F(1, 79) = 0.01, p = .92, \eta^2 = .00$) nor for ‘condition’ was found ($F(1, 79) = 1.07, p = .30, \eta^2 = 0.01$). However, a significant ‘time x condition’ interaction was observed ($F(1, 79) = 5.66, p = .02, \eta^2 = .07$; see Figure 3). Further post-hoc consideration of rumination and control groups separately using paired t-tests indicated that the increase in STAI-S scores observed in ruminators reached trend-level significance ($t(39) = -1.80, p = .08, d = -0.28$); no significant difference in scores was observed in control participants over the week ($t(40) = 1.58, p = .12, d = 0.26$).

On the CES-D, no main effect for ‘time’ ($F(1, 80) = 0.29, p = .59, \eta^2 = .00$) or ‘condition’ ($F(1, 80) = 0.14, p = .71, \eta^2 = .00$) was found. A trend level significance emerged for a ‘time x condition’ interaction ($F(1, 80) = 3.45, p = .06, \eta^2 = 0.04$; Figure 4); however consideration

of rumination and control groups separately did not indicate these differences to be significant (ruminators: $t(40) = -1.55, p = .13, d = -0.24$; controls: $t(40) = 1.04, p = .31, d = 0.17$).

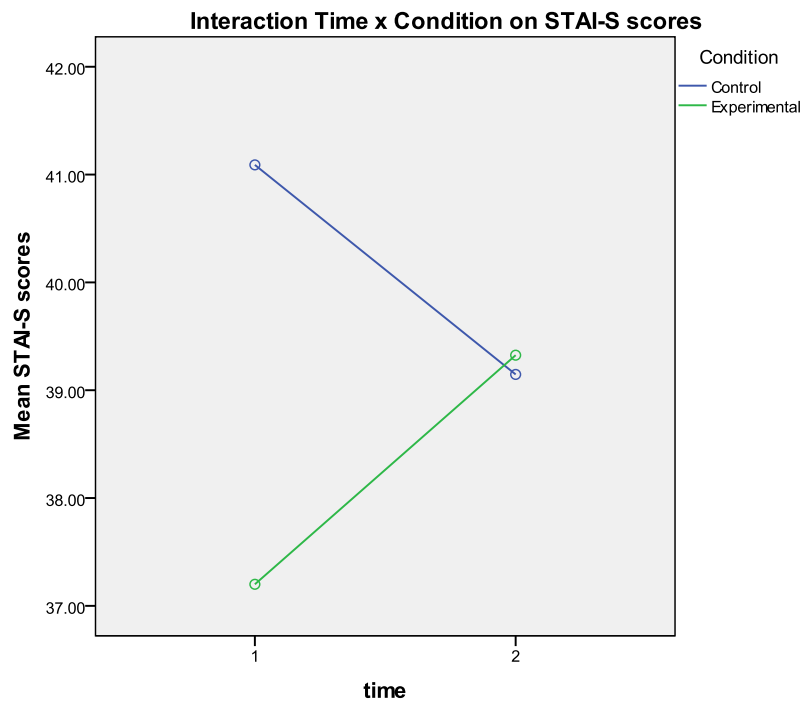


Figure 3: Interaction condition x time on STAI-S scores at Session 1 and 2

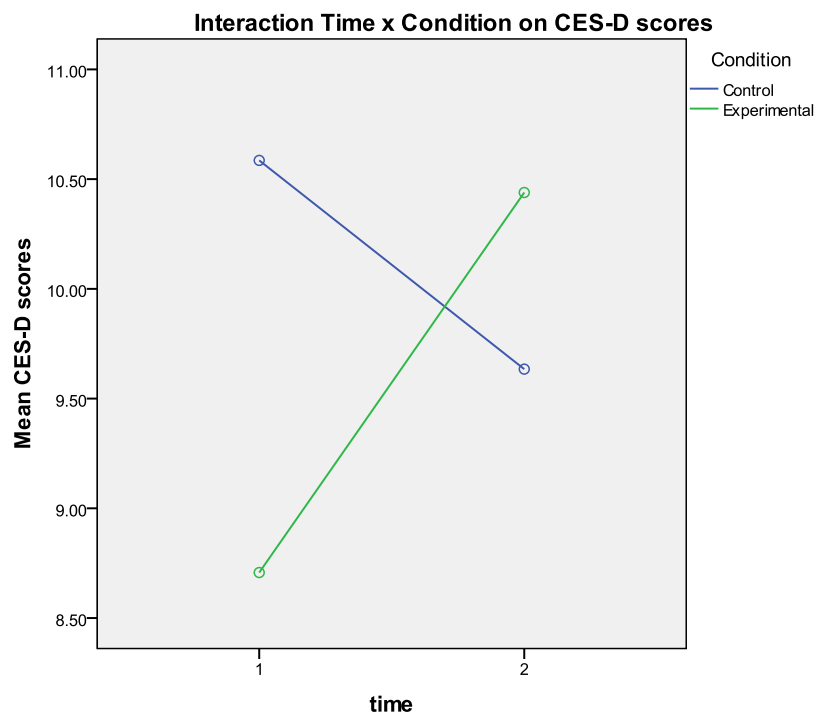


Figure 4: Interaction condition x time on CES-D scores at Session 1 and 2

Additional analysis was run to assess the impact of baseline differences observed between groups (age; previous medical experience; initial unpleasantness rating of the video). Bivariate correlations tested the association between age and affect change, and unpleasantness ratings and affect change. As ‘age’ and ‘unpleasantness’ were not normally distributed, Spearman’s correlation co-efficient was used. No significant association was found between age and change in STAI-S scores ($r_s = .20, p = .08$); age and change in CES-D scores ($r_s = .05, p = .63$); unpleasantness and change in STAI-S scores ($r_s = .17, p = .12$); or unpleasantness and change in CES-D scores ($r_s = .17, p = .13$). A point bi-serial correlation examining the relationship between previous medical experience and change in affect scores found no significant association (STAI-S scores: $r_{pb} = -.19, p = .10$; CES-D scores: $r_{pb} = -.21, p = .06$). As such, further exploratory analysis incorporating these factors as covariates was not conducted.

Gender differences were considered and sex was added as an additional between-group variable. No main effect of ‘sex’ (CES-D: $F(1, 78) = 0.93, p = .34, \eta^2 = .01$; STAI-S: $(1, 77) = 1.65, p = .20, \eta^2 = .02$), ‘condition’ (CES-D: $F(1, 78) = 0.15, p = .70, \eta^2 = .00$; STAI-S: $(1, 77) = 1.10, p = .30, \eta^2 = .01$) or ‘sex x condition’ interaction was found (CES-D: $F(1, 78) = 0.02, p = .88, \eta^2 = .00$; STAI-S: $F(1, 77) = 0.10, p = .76, \eta^2 = .00$).

***Hypothesis 2:** In the period immediately following the experimental induction, participants in the rumination condition will report a greater increase in negative affect and a greater decrease in positive affect than participants in the control condition.*

In order to assess the effect of the in-session manipulation on mood, PANAS-X ratings of fear, sadness, joviality and serenity were obtained pre- and post- manipulation for both groups. Data were log transformed where necessary to better meet assumptions of normality and mixed between-within subjects ANOVAs were conducted for each scale. Descriptive statistics can be found in Table 5 below.

Table 5: Effect of manipulation on affect ratings

		Group		
		Total M (SD)	Ruminators M (SD)	Controls M (SD)
PANAS-X Fear	Pre- manipulation	7.17 (2.45)	7.32 (3.10)	7.02 (1.59)
	Post- 2 min break	7.30 (2.79)	7.85 (3.62)	6.76 (1.43)
PANAS-X Sadness	Pre-manipulation	6.59 (2.25)	6.46 (2.35)	6.71 (2.17)
	Post- 2 min break	6.29 (2.91)	7.17 (2.95)	6.76 (2.89)
PANAS-X Joviality	Pre-manipulation	16.78 (6.52)	18.34 (6.70)	15.22 (6.02)
	Post- 2 min break	14.91 (6.49)	15.10 (6.81)	14.73 (6.25)
PANAS-X Serenity	Pre-manipulation	10.34 (2.08)	10.49 (2.16)	10.20 (2.02)
	Post- 2 min break	8.12 (1.61)	7.98 (1.80)	8.27 (1.40)
SAM valence	Pre-manipulation	2.79 (1.62)	2.98 (1.92)	2.61 (1.24)
	Immediately post-manipulation	2.95 (1.66)	3.15 (1.92)	2.76 (1.36)
	Post- 2min break	2.74 (1.59)	3.02 (1.84)	2.46 (1.27)

No significant main effects for ‘time’ ($F(1, 80) = 0.63, p = .43, \eta^2 = .01$) nor ‘condition’ ($F(1, 80) = 1.59, p = .21, \eta^2 = .02$) were found on fear ratings on the PANAS-X. A significant ‘condition x time’ interaction did emerge ($F(1, 80) = 5.71, p = .02, \eta^2 = .07$). Further exploration of this interaction, considering rumination and control participants separately, indicated the increase in fear reported by ruminators to reach trend-level significance (paired

samples t-test: $t(40) = -1.82, p = .08, d = -0.29$). No difference pre- and post- manipulation was observed in the control group ($t(40) = 1.64, p = .11, d = 0.25$).

Sadness ratings on the PANAS-X indicated neither a significant main effect of ‘condition’ ($F(1, 80) = 0.02, p = .88, \eta^2 = .00$) nor a significant ‘time x condition’ interaction ($F(1, 80) = 3.23, p = .08, \eta^2 = .04$). However, there was a significant main effect of ‘time’ ($F(1, 80) = 4.25, p = .04, \eta^2 = .05$), suggesting both groups to have experienced similar increases in sadness.

For the joviality subscale of the PANAS-X, no main effect of ‘condition’ emerged ($F(1, 80) = 1.37, p = .25, \eta^2 = .02$) but a significant main effect of ‘time’ was found ($F(1, 80) = 24.15, p < .01, \eta^2 = .23$), with a significant decrease in joviality observed for both groups. This was qualified by a significant ‘time x condition’ interaction ($F(1, 80) = 11.87, p < .01, \eta^2 = .13$), indicating ruminators to display a greater drop in positive mood than controls following the experimental induction.

Unexpectedly, the SAM measure of valence did not replicate these findings. There was no significant main effect for ‘time’ either immediately following the manipulation ($F(1, 80) = 1.32, p = .25, \eta^2 = .02$) or post-spontaneous rumination period ($F(1, 80) = 0.17, p = .68, \eta^2 = .00$); no main effect of ‘condition’ (post-manipulation: $F(1, 80) = 1.28, p = .26, \eta^2 = .02$; post-spontaneous rumination period: $F(1, 80) = 1.94, p = .17, \eta^2 = .02$); and no ‘time x condition’ interactions (post-manipulation: $F(1, 80) = 0.01, p = .93, \eta^2 = .00$; post-spontaneous rumination induction period: $F(1, 80) = 0.69, p = .41, \eta^2 = .01$).

Serenity ratings on the PANAS-X indicated neither a significant main effect of ‘condition’ ($F(1, 80) = 0.07, p = .79, \eta^2 = .00$) nor a significant ‘time x condition’ interaction ($F(1, 80) = 2.41, p = .12, \eta^2 = .03$). However, there was a significant main effect of ‘time’ ($F(1, 80) = 108.79, p < .01, \eta^2 = .58$) suggesting both groups to have experienced similar decreases in serenity.

Consideration of gender as an additional between-group variable did not alter the results with respect to fear, joviality or serenity ratings on the PANAS-X, or SAM-valence ratings (all $F_s < 2.87; p > .05$). However, a specific gender difference emerged with respect to ratings of sadness on the PANAS-X. A main effect of ‘sex’ was indicated ($F(1, 78) = 4.31, p = .04, \eta^2 = .05$), with no main effect of ‘condition’ or ‘condition x sex’ interaction ($F(1, 78) = 0.40, p = .53, \eta^2 = .01$). When incorporated in analysis as an additional between-group variable, the previously observed main effect for ‘time’ disappeared ($F(1, 78) = 1.60, p =$

.21, $\eta^2 = .02$). Further exploratory analysis indicated a main effect of ‘time’ to occur for female participants only ($F(1, 62) = 4.29, p = .04, \eta^2 = .07$), with no increase in sadness reported by male participants ($F(1, 16) = 0.13, p = .72, \eta^2 = .01$).

Additional analyses explored the impact of between-group differences at baseline (age, previous medical experience and unpleasantness ratings). No significant correlations were indicated in a series of bivariate and biserial correlations conducted (all $r = -.21$ to $r = .13; p > .05$) and therefore these factors were not added as covariates when examining the impact of the manipulation on mood.

3.3.2 Effect of the experimental manipulation on intrusive images

Hypothesis 3: Participants in the rumination condition will experience a greater number of intrusive images over the week than participants in the control condition.

The total means and standard deviations of the intrusive images reported for both conditions over Days 1-6 are shown in Table 6 below. The total number of intrusive images experienced by both groups over the week was also considered. Two participants ($n = 2$, both controls) had missing data on one day each. Total intrusions over the week were calculated if participants had more than 75% complete diary data for intrusions. All participants fulfilled this criterion.

Table 6: Intrusive images experienced by day

Group		Images experienced by day						
		Day 1 M (SD)	Day 2 M (SD)	Day 3 M (SD)	Day 4 M (SD)	Day 5 M (SD)	Day 6 M (SD)	Total M (SD)
Ruminators	Raw means (SD)	5.02 (11.01)	3.01 (4.21)	2.62 (5.44)	2.44 (3.33)	2.12 (3.14)	1.95 (2.76)	16.78 (26.70)
	Log transformed means (SD)	0.54 (0.41)	0.42 (0.39)	0.33 (0.40)	0.36 (0.35)	0.33 (0.37)	0.32 (0.35)	0.97 (0.51)
Controls	Raw means (SD)	3.04* (3.47)	4.27 (11.29)	1.94 (3.10)	1.91 (3.21)	1.33 (2.12)	1.86* (3.35)	14.35 (18.22)
	Log transformed means (SD)	0.45 (0.32)	0.41 (0.45)	0.30 (0.36)	0.29 (0.36)	0.25 (0.31)	0.27 (0.37)	0.83 (0.60)

* = missing data from $n=1$

Data were log transformed to better meet normality assumptions and to address outliers, and an independent t-test was conducted to compare the difference in total means across condition. Data met the assumption for homogeneity of variance as evident from a non-significant Levene's test ($F(80) = 3.07, p = .08$). Analysis indicated that the total number of intrusive images reported by the rumination condition ($M = 16.78, SD = 26.70$) was not significantly greater than that experienced by controls ($M = 14.35, SD = 18.22; t(80) = -1.13, p = .26, d = 0.11$). No significant difference existed between average ratings of image distress over the week between ruminators ($M = 14.3, SD = 18.4$) or controls ($M = 10.9, SD = 13.6; t(78) = -0.61, p = .55, d = 0.21$).

An analysis of co-variance (ANCOVA) was also conducted to compare the groups whilst controlling for the number of spontaneously occurring images arising immediately after the video and trait rumination (as evidenced on PTQ-T scores). The independence of the covariates on the independent variable ('condition') had previously been established (images

post-video: $t(80) = -5.33, p = .60, d = -0.18$; trait rumination: $t(80) = 0.68, p = .50, d = -0.15$). There remained no effect for ‘condition’ when post-video images ($F(1, 79) = 0.99, p = .32, \eta^2 = .01$) or trait rumination ($F(1, 79) = 1.63, p = .21, \eta^2 = .02$) were controlled for in analyses, although the covariates did predict total number of images reported over the week’s extended manipulation (post-video images: $F(1, 79) = 19.29, p < .01, \eta^2 = .20$; trait rumination: $F(1, 79) = 6.18, p = .02, \eta^2 = .07$). Bivariate correlations indicated that trait rumination did not account for the number of post-video images experienced (Pearson’s correlation co-efficient: $r = .04, p = .74$). However a significant association between unpleasantness ratings of the video and number of post-video images did emerge ($r = .23, p = .01$).

Diary data was also considered by day, in order to assess for any differences emerging between groups at differing time points over the week. A mixed between-within subjects 6×2 ANOVA was used to compare differences by day between each condition. The Greenhouse-Geisser correction has been reported to address the violation of the assumption of sphericity on Mauchly’s Test of Sphericity ($p = <0.01$). There was no significant main effect for ‘condition’ ($F(1, 78) = 0.56, p = .46, \eta^2 = .01$) nor a significant ‘time x condition’ interaction ($F(4.17, 325.57) = 0.38, p = .83, \eta^2 = .01$), indicating that participants in the rumination condition did not experience a greater number of images over the week than control participants. However, a significant main effect for ‘time’ emerged ($F(4.17, 325.57) = 10.67, p < .01, \eta^2 = .12$). Within-subject contrasts indicated significant linear ($F(1, 78) = 32.77, p < .01, \eta^2 = .30$) and quadratic progressions ($F(1, 78) = 8.34, p = .01, \eta^2 = .10$) for ‘time’, suggesting both ruminators and controls to have experienced a decline in number of images experienced as the week progressed, with a slight increase in images towards the end of the week (Figure 5).

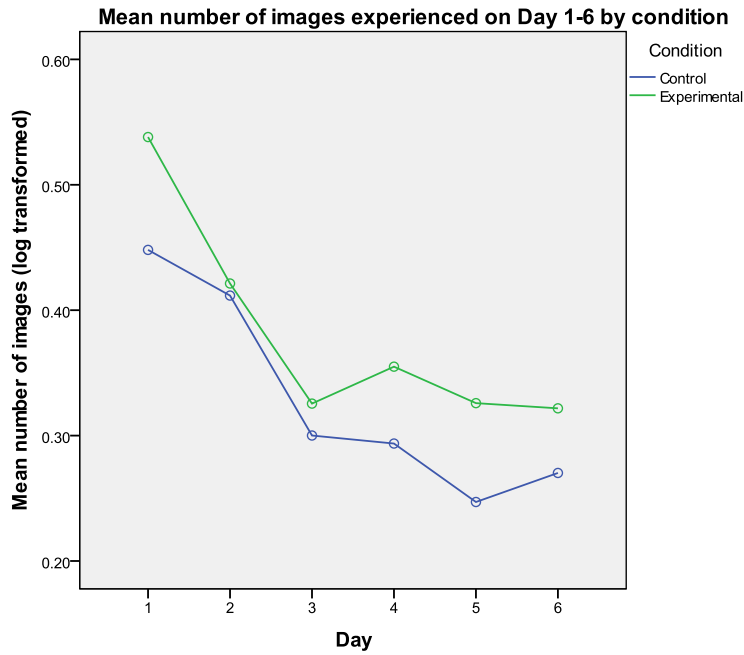


Figure 5: Mean number of images (log transformed) reported on Day 1-6 by condition

Consideration of gender effects indicated no significant main effect of ‘condition’ ($F(1, 76) = 0.07, p = .79, \eta^2 = .00$) or ‘sex x condition’ interaction ($F(1, 76) = 0.41, p = .53, \eta^2 = .01$). However, a significant main effect of ‘sex’ was observed ($F(1, 76) = 6.85, p = .01, \eta^2 = .08$), which was qualified by a significant ‘sex x time’ interaction ($F(4.16, 316.07) = 3.13, p = .01, \eta^2 = .04$). Further exploratory analysis indicated that male participants had reported significantly fewer images than female participants (Figure 6 below). Factors that might explain this gender difference were explored, including differences in initial emotional or physiological responses to the video. There was no difference between male and females with respect to change in heart-rate response during presentation of the video ($F(1, 79) = 3.47, p = .07, \eta^2 = .04$); unpleasantness ratings of the video ($t(80) = -1.47, p = .15, d = -0.36$); attention paid to the video ($t(80) = 0.12, p = .91, d = 0.03$); or SAM-scale valence ratings of the video ($F(1, 80) = 0.19, p = .66, \eta^2 = .00$).

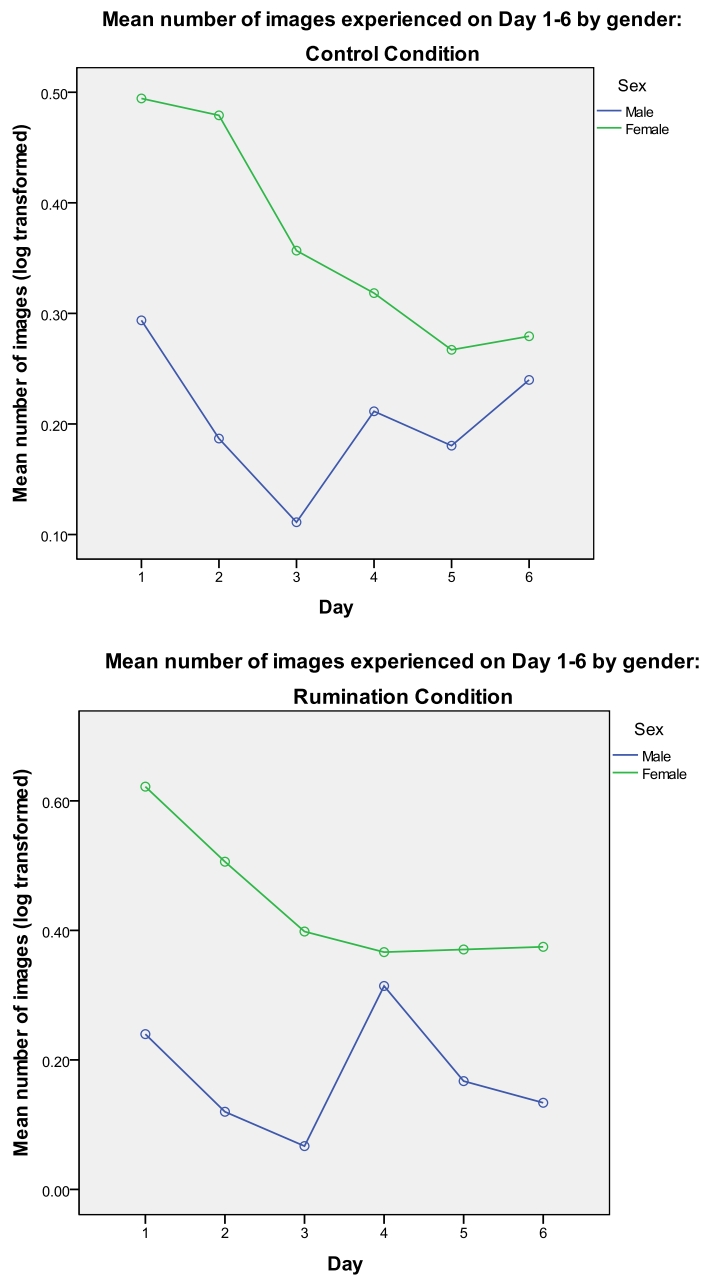


Figure 6: Control and rumination conditions: Mean number of images reported by day

Additional analysis explored the impact of between-group differences at baseline. A bivariate correlation indicated no significant associations between age and number of images experienced each day (all: $r_s = -.12$ to $-.02$; $p > .05$). Similarly, a point bi-serial correlation indicated no significant associated between prior medical experience and number of images (all: $r_{pb} = .03$ to $.13$; $p > .05$). As such these factors were not added as covariates to analyses.

A significant association was indicated between initial unpleasantness ratings of the video and number of images over the week (all $r_s = .17$ to $.32$; $p < .05$). When added to the mixed-

model as a covariate, a main effect for ‘unpleasantness’ was indicated ($F(1, 77) = 8.53, p = .01, \eta^2 = .10$). There remained no effect of ‘condition’ ($F(1, 77) = 0.01, p = .95, \eta^2 = .00$) or significant ‘time x condition’ interaction ($F(4.19, 323.35) = 0.63, p = .68, \eta^2 = .01$). However, the main effect of ‘time’ previously observed became non-significant ($F(4.19, 323.35) = 0.91, p = .46, \eta^2 = .01$) indicating that when unpleasantness ratings were controlled for, the overall decline in number of images disappeared.

***Hypothesis 4:** In the period immediately following the experimental induction, participants in the rumination condition will report a greater number of intrusive images than the control condition.*

All participants were asked to report the number of intrusive images experienced in the two-minute spontaneous rumination phase following the rumination/control task (Table 7). Data was missing for one participant (in the control condition) who failed to provide an image estimate. Log transformation was used to meet assumptions of normality, and data met the assumption for homogeneity of variance as evident from a non-significant Levene's test ($F(79) = 3.20, p = .07$). An independent t-test compared the number of intrusive images experienced by the rumination ($M = 3.22, SD = 5.13$) and control ($M = 1.83, SD = 3.41$) groups post-manipulation. The results of the independent t-test indicated there to be no significant difference between the groups ($t(76.3) = -1.16, p = .11, d = 0.32$). A significant difference did exist between average ratings of image distress, with ruminators ($M = 23.66, SD = 27.75$) reporting greater image distress than control participant ($M = 9.50, SD = 15.01$; $t(79) = -2.31, p = .02, d = 0.63$).

Table 7: Intrusive images experienced by condition

Images	Group		
	Total M (SD)	Ruminators M (SD)	Controls* M (SD)
Post-manipulation spontaneous rumination phase	2.53 (4.40)	3.22 (5.13)	1.83 (3.41)

* = missing data from $n=1$

An analysis of co-variance (ANCOVA) was also conducted to compare the groups whilst controlling for the number of spontaneously occurring images arising immediately after the video. There remained no main effect for 'condition' when number of images post-video was added as a covariate ($F(1, 78) = 2.60, p = .11, \eta^2 = .03$), although the covariate did predict number of images reported in the post-manipulation spontaneous rumination phase ($F(1, 78) = 14.83, p < .01, \eta^2 = .16$).

These results were not altered by the addition of gender as a further between-group variable, with no significant main effect of 'sex' ($F(1, 76) = 1.94, p = .17, \eta^2 = 0.03$), 'condition' ($F(1, 76) = 1.22, p = .27, \eta^2 = .02$) or interaction between 'sex x condition' found ($F(1, 76) = 0.17, p = .68, \eta^2 = .00$).

Additional analyses explored the impact of between-group differences at baseline. Bivariate correlations between age and number of images ($r_s = -.05$, $p = .65$); unpleasantness and number of images ($r_s = .17$, $p = .14$); or previous medical experience and number of images ($r_{pb} = .01$, $p = .92$) did not indicate significant associations and therefore these factors were not added as covariates to analyses.

Hypothesis 5: *In the period immediately following the experimental induction, participants in the rumination condition will report greater spontaneously occurring rumination (on the PTQ-S) than participants in the control group.*

Participants were asked to report spontaneously occurring ruminative thinking in the two-minute period immediately following termination of the experimental manipulation, on the PTQ-S. One participant (in the control condition) failed to complete the PTQ-S sufficiently for a total score to be computed. The square root transformation was applied to data to ensure the assumption of normality was met, and an independent t-test was conducted to compare this difference. Equality of variances was indicated by Levene's test ($F(79) = 0.37$, $p = .54$). Analysis indicated there to be no significant difference between participants in the experimental group ($M = 15.37$, $SD = 13.97$) and controls ($M = 11.23$, $SD = 12.01$) with respect to levels of ruminative thinking reported during the two-minute spontaneous rumination phase ($t(79) = -1.35$, $p = .18$, $d = 0.32$).

Consideration of gender differences using an ANOVA indicated no significant main effect for 'condition' ($F(1, 77) = 0.54$, $p = .47$, $\eta^2 = .01$) or interaction between 'sex x condition' ($F(1, 77) = 0.52$, $p = .47$, $\eta^2 = .01$). However, a significant main effect for 'sex' ($F(1, 77) = 5.03$, $p = .03$, $\eta^2 = .06$) was observed, with female participants more likely to report experiences of naturally-occurring rumination following the manipulation than male participants (see Figure 7).

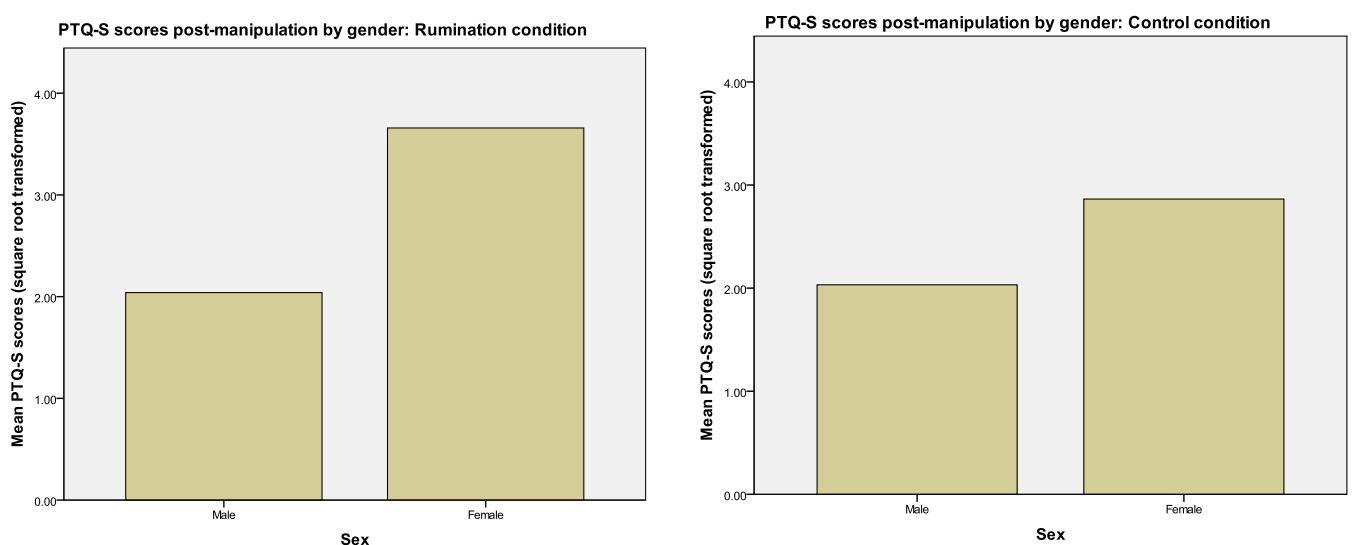


Figure 7: PTQ-S scores post- manipulation by gender for rumination and control conditions

An analysis of covariance (ANCOVA) was also conducted to compare the groups whilst controlling for the levels of spontaneously occurring rumination immediately after the video and trait rumination (on the PTQ-T). There remained no main effect for 'condition' ($F(1, 77) = 1.78, p = .19, \eta^2 = .02$) when these covariates were added to analysis, although both post-video levels of state rumination ($F(1, 77) = 12.39, p < .01, \eta^2 = .14$) and trait scores ($F(1, 77) = 4.98, p = .03, \eta^2 = .06$) did predict tendency to ruminate post-manipulation.

These results were not altered by the addition of gender as a further between-group variable, with no significant main effect of 'sex' ($F(1, 75) = 9.01, p = .26, \eta^2 = .92$), 'condition' ($F(1, 75) = 3.23, p = .47, \eta^2 = .87$) or interaction between 'sex x condition' found ($F(1, 75) = 0.27, p = .61, \eta^2 = .00$).

Additional analyses explored the impact of between-group differences at baseline. Bivariate correlations between age and post-manipulation PTQ-S scores ($r_s = -.09, p = .43$); unpleasantness and PTQ-S scores ($r_s = .15, p = .17$); or previous medical experience and PTQ-S scores ($r_{pb} = .13, p = .26$) did not indicate significant associations and therefore these factors were not added as covariates to the mixed model.

3.3.3 Effect of experimental manipulation on heart-rate responses

Hypothesis 6: Participants in the rumination condition will show a greater increase in physiological arousal (heart-rate response) during the experimental manipulation compared to baseline than controls.

Heart-rate (HR) during the experimental manipulation was assessed to provide an objective measure of physiological arousal. Average heart-rate during i) the pre-manipulation baseline and ii) during the process of the experimental manipulation was used in analysis. Baseline mean heart-rates did not differ significantly between the control ($M = 68.16$, $SD = 12.47$) and rumination ($M = 64.53$, $SD = 8.83$) conditions ($t(77) = 1.49$, $p = .14$, $d = 0.34$). Table 8 (below) highlights the descriptive characteristics for measurements of physiological arousal.

Table 8: Effect of manipulation on levels of physiological arousal

		Group		
		Total M (SD)	Ruminators M (SD)	Controls M (SD)
Mean HR (bpm)*	Baseline	66.32 (10.87)	64.53 (8.83)	68.16 (12.47)
	Experimental manipulation	66.63 (11.66)	64.57 (9.47)	68.80 (13.38)
SAM arousal	Baseline (pre- manipulation)	6.41 (1.22)	6.32 (1.25)	6.05 (1.18)
	Immediately post- in- session manipulation	5.34 (1.46)	4.85 (1.44)	5.83 (1.32)
	Post- 2-min break	5.71 (1.39)	5.46 (1.52)	5.95 (1.22)

* = missing data from $n = 4$

Any change in heart-rate from measurement at baseline to during the experimental manipulation was assessed using a mixed between-within subjects ANOVA. Mean heart-rates were used, as these have been indicated to be a more stable measurement of physiological arousal than consideration of peak heart-rate responses. In total, 4 participants had data missing from analysis: all were due to difficulties in extracting data due to ‘noisy’ heart-rate signals (control group: $n = 3$; rumination group: $n = 1$).

No main effect of ‘condition’ ($F(1, 76) = 2.41$, $p = .13$, $\eta^2 = .03$), ‘time’ ($F(1, 76) = 0.71$, $p = .40$, $\eta^2 = .01$), or interaction between ‘time x condition’ ($F(1, 76) = 0.60$, $p = .44$, $\eta^2 = .01$) was found, indicating there to be no significant change in heart-rate from baseline to manipulation within either group. These results did not change when initial heart-rate response to the video was included as a covariate to the mixed ANOVA.

Consideration of gender indicated there to remain no main effect of ‘condition’ ($F(1, 74) = 0.12, p = .73, \eta^2 = .00$), or interaction between ‘sex x condition’ ($F(1, 74) = 2.84, p = .10, \eta^2 = .04$). However, a main effect of ‘sex’ was observed ($F(1, 74) = 7.06, p = .01, \eta^2 = .09$). Further exploratory analyses indicated female participants to have displayed greater mean heart-rates than male participants, both at baseline (female: $M = 67.64, SD = 10.40$; male: $M = 61.16, SD = 11.49$) and during the manipulation (female: $M = 68.48, SD = 10.84$; male: $M = 59.99, SD = 12.41$).

The impact of between-group differences at baseline on heart-rate response was explored. Bivariate correlations did not indicate significant correlations (age and change in heart-rate: $r_s = -.15; p = .17$; unpleasantness and change in heart-rate: $r_s = .13; p = .27$; previous medical experience and change in heart-rate: $r_{pb} = -.03; p = .80$) and as such these factors were not added as covariates to the mixed model.

These findings were not consistent with the SAM self-report index of arousal. While the objective measure of arousal provided by heart-rate responses indicated no change from baseline to in-manipulation measurements, on the SAM self-report index a significant main effect of ‘time’ was indicated, with both groups reporting a significant decline in arousal both immediately post-manipulation ($F(1, 80) = 42.53, p < .01, \eta^2 = .35$) and following the two-minute spontaneous rumination phase ($F(1, 80) = 13.40, p < .01, \eta^2 = .14$). No main effect of ‘condition’ was found for ratings of arousal immediately post-manipulation ($F(1, 80) = 1.89, p = .17, \eta^2 = .02$) or post-spontaneous rumination phase ($F(1, 80) = 0.18, p = .67, \eta^2 = .00$). However, significant ‘time x condition’ interaction effects were observed (post-manipulation: $F(1, 80) = 23.23, p < .01, \eta^2 = .23$; post-spontaneous rumination phase: $F(1, 80) = 8.47, p = .01, \eta^2 = .10$) indicating participants in the rumination group to report a greater decrease in scores than controls.

Consideration of gender did not alter these findings. There was no significant main effects for ‘sex’, ‘condition’, ‘sex x condition’ or ‘sex x condition x time’ (all $F_s < 2.01, p > .05$). No significant correlations between baseline between-group differences (age, unpleasantness ratings or prior medical experience) with self-report measures of arousal were found (all $r_s = -.19$ to $r_s = .07; p > .05$) and as such were not included as covariates to the mixed model.

Hypothesis 7: Participants in the rumination condition will show greater physiological arousal (heart-rate response) to trauma-related pictures than controls. Participants in control and rumination conditions will not differ in heart-rate responses to neutral pictures.

Descriptive statistics illustrating heart-rate responses (HRRs) to each of the picture types (trauma, general threat, neutral), over the six seconds immediately following picture onset, are shown in Table 9 (below). Heart-rate responses to trauma and neutral pictures only are depicted in Figure 8. One participant (rumination condition, $n=1$) was excluded from analysis due to an irregular heart-beat.

Table 9: Mean and standard deviations of HRRs across picture type

Condition	Picture Type	HRR for second following picture onset						
		Baseline M (SD)	Second 1 M (SD)	Second 2 M (SD)	Second 3 M (SD)	Second 4 M (SD)	Second 5 M (SD)	Second 6 M (SD)
Rumination*	Trauma	66.97 (12.06)	-0.02 (1.07)	-0.47 (1.88)	-0.94 (2.04)	-0.99 (2.02)	-0.49 (2.22)	-0.65 (1.92)
	General threat	67.50 (12.11)	-0.73 (2.08)	-1.24 (2.29)	-1.34 (2.70)	-1.07 (2.61)	-0.99 (2.26)	-1.15 (2.47)
	Neutral	67.45 (11.94)	-0.45 (1.08)	-0.63 (1.89)	-0.35 (1.64)	-0.80 (1.88)	-0.87 (2.08)	-0.72 (1.72)
Control	Trauma	67.46 (10.11)	-0.39 (0.93)	-0.97 (1.57)	-0.91 (1.63)	-1.02 (1.46)	-1.17 (1.50)	-0.83 (1.52)
	General threat	68.01 (10.45)	-0.47 (0.88)	-1.03 (1.77)	-1.10 (1.99)	-1.24 (2.09)	-0.95 (1.91)	-0.82 (1.95)
	Neutral	67.88 (10.24)	-0.31 (1.07)	-0.62 (1.61)	-0.57 (1.55)	-0.25 (2.00)	-0.35 (2.36)	-0.60 (2.29)

* = missing data from $n=1$

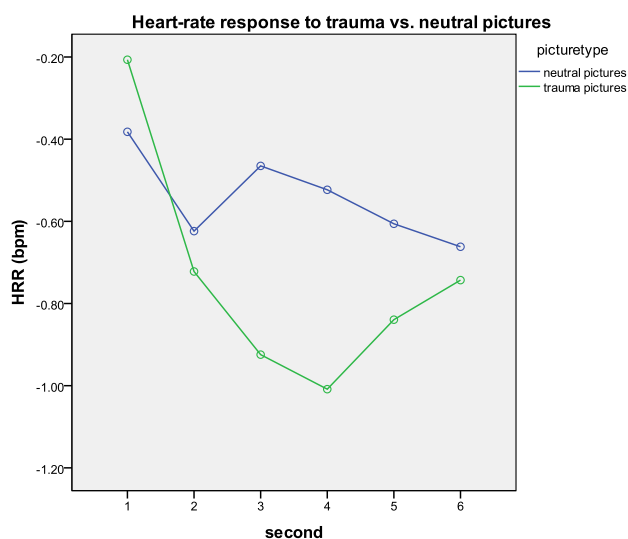


Figure 8: Mean HRR to trauma-related and neutral pictures over seconds 1-6

The existing evidence-base on heart-rate responses to pictorial stimuli indicates a typical two-stage pattern of responding, comprising an initial deceleration (or ‘orienting’ effect) followed by subsequent acceleration in heart-rate (cf. Bradley et al., 2001; Lang et al., 1993). As such, data analysis was conducted accordingly, commensurate with the approach utilised by Bradley et al. (2001) in which the peak deceleration over seconds 1-3 and peak acceleration over seconds 4-6 were considered independently, in order to minimize potential biphasic effects. Peak deceleration and acceleration over the respective time-points were calculated for each picture individually, before being averaged across picture type (see Table 10 below). Within-subjects repeated measures ANOVAs were used to consider these deceleration and subsequent acceleration effects.

Table 10: Means and standard deviations of peak deceleration and acceleration by picture type

HRR	Picture type	Group		
		Rumination*	Control	Total
Mean peak deceleration seconds 1-3 (SD)	Trauma	-3.14 (2.27)	-3.29 (1.75)	-3.21 (2.01)
	General threat	-3.79 (3.07)	-3.27 (1.79)	-3.54 (2.51)
	Neutral	-3.27 (2.16)	-2.87 (2.01)	-3.07 (2.09)
Mean peak acceleration seconds 4-6 (SD)	Trauma	2.03 (2.21)	1.47 (1.76)	1.75 (2.00)
	General threat	1.90 (2.66)	1.51 (2.04)	1.71 (2.36)
	Neutral	1.97 (1.97)	2.16 (2.12)	2.06 (2.03)

* = missing data from $n=1$

Deceleration phase:

Consideration of decelerative heart-rate responses over seconds 1-3 for trauma vs. neutral pictures only indicated no significant main effect of ‘condition’ ($F(1, 79) = 0.70, p = .80, \eta^2 = .00$), ‘picture type’ ($F(1, 79) = 0.34, p = .56, \eta^2 = .00$) or ‘picture type x condition’ interaction ($F(1, 79) = 1.50, p = .22, \eta^2 = .02$). These results remained unaltered with consideration of the general threat pictures (no main effect of ‘condition’: $F(1, 78) = 0.36, p = .55, \eta^2 = .01$; ‘picture type’: $F(2, 156) = 2.34, p = .10, \eta^2 = .03$; ‘picture type x condition’ interaction: $F(2, 156) = 1.30, p = .28, \eta^2 = .02$).

Consideration of gender indicated no main effect for ‘sex’ ($F(1, 77) = 0.24, p = .63, \eta^2 = .00$), ‘condition’ ($F(1, 77) = 0.14, p = .71, \eta^2 = .00$) or ‘sex x condition’ ($F(1, 77) = 0.09, p = .77, \eta^2 = .00$) interactions. However, when gender was added as an additional between-group variable, a trend level significance for ‘picture type x condition’ interaction emerged

($F(1, 77) = 3.33, p = .07, \eta^2 = .04$). Despite this, further exploratory analysis of male and female participants individually did not indicate significant main effects for ‘condition’ (male: $F(1, 16) = 0.17, p = .69, \eta^2 = .01$; female: $F(1, 61) = 0.01, p = .93, \eta^2 = .00$), ‘picture type’ (male: $F(1, 16) = 0.53, p = .48, \eta^2 = .03$; female: $F(1, 61) = 1.36, p = .25, \eta^2 = .02$) or ‘picture type x condition’ interactions (male: $F(1, 16) = 2.61, p = .13, \eta^2 = .14$; female: $F(1, 61) = 0.18, p = .68, \eta^2 = .00$).

Additional analyses considered initial between group differences. Consideration of age (all $F_s < 2.32, p > .05$) and initial unpleasantness ratings of the video (all $F_s < 1.15, p > .05$) did not alter the results above.

When previous medical experience was considered, a trend level of significance emerged for ‘picture type’ ($F(1, 78) = 2.94, p = .09, \eta^2 = .04$). No main effect of ‘previous medical experience’ ($F(1, 78) = 1.05, p = .34, \eta^2 = .01$), ‘condition’ ($F(1, 78) = 0.001, p = .98, \eta^2 = .00$) or ‘picture type x condition’ interactions ($F(1, 78) = 2.64, p = .11, \eta^2 = .03$) were observed. Further exploratory analyses of participants with and without previous medical experience separately indicated no significant main effects of ‘condition’ (with previous medical experience: $F(1, 12) = 1.92, p = .19, \eta^2 = .14$; without: $F(1, 65) = 0.33, p = .57, \eta^2 = .01$), ‘picture type’ (with previous medical experience: $F(1, 12) = 2.45, p = .14, \eta^2 = .17$; without: $F(1, 65) = 0.02, p = .88, \eta^2 = .00$), ‘condition x picture type’ interaction (with previous medical experience: $F(1, 12) = 0.70, p = .42, \eta^2 = .06$; without: $F(1, 65) = 1.99, p = .16, \eta^2 = .03$), indicating this variable not to change the results above.

Acceleration phase:

Examination of accelerative heart-rate responses over seconds 4-6 for trauma vs. neutral pictures only indicated no main effect of ‘condition’ ($F(1, 79) = 0.39, p = .54, \eta^2 = .01$), ‘picture type’ ($F(1, 79) = 1.28, p = .26, \eta^2 = .02$) or ‘picture type x condition’ interaction ($F(1, 79) = 1.86, p = .18, \eta^2 = .02$). These results remained unaltered with consideration of the general threat pictures (no main effect of ‘condition’: $F(1, 78) = 0.51, p = .48, \eta^2 = .01$; ‘picture type’: $F(2, 156) = 0.99, p = .37, \eta^2 = .01$; ‘picture type x condition’ interaction: $F(2, 156) = 0.99, p = .37, \eta^2 = .01$).

Gender effects within peak acceleration over the second phase were considered. No main effect for ‘sex’ ($F(1, 77) = 0.19, p = .66, \eta^2 = .00$), ‘condition’ ($F(1, 77) = 0.06, p = .81, \eta^2 = .00$) or ‘sex x condition’ ($F(1, 77) = 1.86, p = .18, \eta^2 = .02$) interactions were observed. Similar to gender effects over the first phase, when added as an additional between-group

variable, a trend level significance for ‘picture type x condition’ interaction emerged ($F(1, 77) = 3.10, p = .08, \eta^2 = .04$). Despite this, further exploratory analysis of male and female participants individually did not indicate significant main effects for ‘condition’ (male: $F(1, 15) = 4.30, p = .06, \eta^2 = .22$; female: $F(1, 61) = 1.26, p = .27, \eta^2 = .02$), ‘picture type’ (male: $F(1, 15) = 1.23, p = .28, \eta^2 = .08$; female: $F(1, 61) = 0.70, p = .41, \eta^2 = .01$) or significant ‘condition x picture type’ interactions (male: $F(1, 15) = 1.10, p = .31, \eta^2 = .07$; female: $F(1, 61) = 0.36, p = .55, \eta^2 = .01$).

Additional analyses considered initial between-group differences. Consideration of age (all $F_s < 2.85, p > .05$) and initial unpleasantness ratings of the video (all $F_s < 1.61, p > .05$) did not alter these results.

When previous medical experience was added as a covariate to the model, no main effects of ‘condition’ ($F(1, 78) = 0.17, p = .68, \eta^2 = .00$) or ‘previous medical experience’ ($F(1, 78) = 0.50, p = .48, \eta^2 = .01$) were found, however, a significant main effect of picture type ($F(1, 78) = 4.05, p = .05, \eta^2 = .05$) and a trend level significance for ‘picture type x condition’ interaction ($F(1, 78) = 3.18, p = .08, \eta^2 = .04$) emerged. Further exploratory analyses of participants with and without previous medical experience separately indicated no significant main effects of ‘condition’ (with previous medical experience: $F(1, 12) = 2.80, p = .12, \eta^2 = .19$; without: $F(1, 65) = 0.04, p = .84, \eta^2 = .00$), ‘picture type’ (with previous medical experience: $F(1, 12) = 1.37, p = .27, \eta^2 = .10$; without: $F(1, 65) = 0.07, p = .79, \eta^2 = .00$).

However, a significant ‘condition x picture type’ interaction did emerge for those participants who *did not* have previous medical experience only ($F(1, 65) = 3.99, p = .05, \eta^2 = .06$; without: $F(1, 12) = 0.04, p = .85, \eta^2 = .00$). Overall, this finding suggests that within participants without prior medical experience, ruminators experienced a significantly greater increase in heart-rate on presentation of the trauma pictures than to neutral pictures. Control participants conversely demonstrated lower peak acceleration to trauma pictures than to neutral pictures. This is indicated in Figure 9 below.

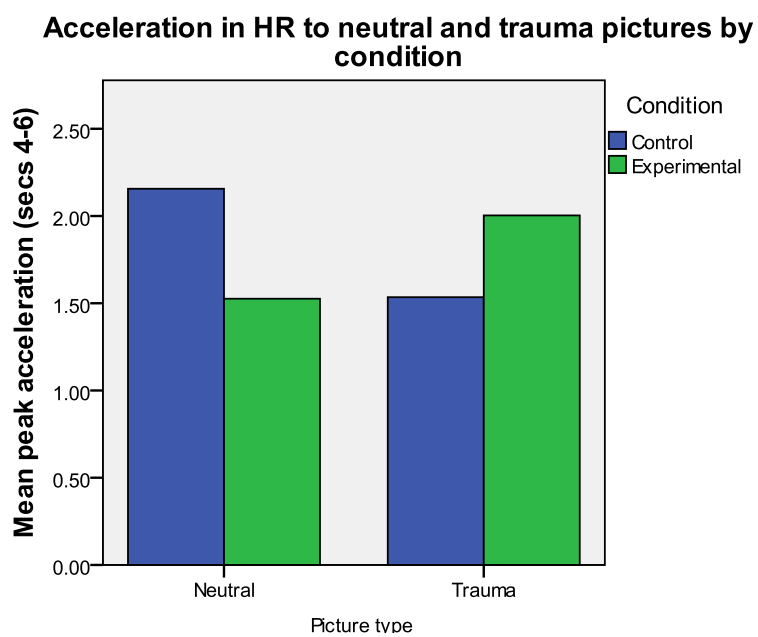


Figure 9: Participants without prior medical experience only: Mean HR acceleration response

4. DISCUSSION

4.1 Summary of findings

The aim of the present study was to experimentally investigate the effects of rumination on selected symptoms characteristic of PTSD: namely mood, intrusive memories and physiological arousal. Consideration of the results outlined above indicates that, overall, the main hypotheses of this study were not supported. Firstly, rumination did not appear to engender significantly greater increases in low mood or anxiety over the course of a week-long manipulation, compared to a control task (although a non-significant trend towards increased anxiety was noted in rumination participants). In line with this, no difference between the groups was found with respect to increases in fear or sadness ratings - or decreases in positive mood ratings - following the in-session manipulation (again, however, trend-level increases in fear were observed for participants in the rumination condition only). Secondly, ruminators did not report a greater number of intrusive image experiences than controls, either over the week's manipulation or following the in-session task. However, interestingly, *trait* rumination emerged as a better predictor of image frequency than did condition allocation. Thirdly, hypotheses regarding the impact of rumination on physiological arousal received mixed support: whilst ruminators did not exhibit greater mean heart-rates than controls during the experimental manipulation, participants in the rumination condition did exhibit greater *acceleration* in heart-rate response on presentation of trauma-relevant cues (when previous medical experience was controlled for). The above findings, and their implications, are reviewed in greater detail below.

4.1.1 Manipulation Checks

Consideration of the manipulation checks indicated that the trauma-film was rated as moderately unpleasant by participants, with high levels of reported attention to video content. Pre- and post-video ratings of affect highlighted it to have been successful in inducing both fear and sadness (consistent with previous experimental studies, e.g. Zetsche Ehring & Ehlers, 2009); to have led to decreased positive affect; and to have promoted trend-level increases in heart-rate - significant on consideration of the first-half of the video - in addition to subjective increases in physiological arousal. Although all ratings of negative mood and arousal increased from pre- to immediately post-video, participants reported a subjective *decline* in arousal during the subsequent spontaneous rumination phase, perhaps indicating this two-minute break to have had a calming effect. Nonetheless, the video gave

rise to both spontaneous intrusive image experiences (with an average of 4.4 images arising) and prompted low to moderate levels of spontaneously occurring rumination. As would be expected from randomization, these affective, physiological and cognitive changes were experienced to similar degrees by participants across both conditions. In sum, the fact that the video was successful in their generation can be taken as evidence for its appropriateness as an analogue stressor.

Checks of adherence to the experimental manipulation confirmed that participants in the rumination condition did engage in significantly higher levels of in-task dwelling (on the video and related topics) than control participants. As such, it appeared that the two post-event processing conditions were successful in generating differential mental processes. Similarly, consideration of faithfulness to task completion over the week-long extended manipulation (MCQ) indicated participants to report high task compliance.

Participants in rumination and control conditions displayed similar levels of tendency toward repetitive thinking at baseline, as evidenced by two measures of trait rumination (PTQ-T and RSQ) in addition to a measure of trait anxiety (STAI-T) and worry (PSWQ). Overall therefore, any subsequent differences emerging between the groups on the dependent variables were unlikely to be attributable to trait differences.

4.1.2 Impact of rumination on negative affect

Findings for the first hypothesis were not supported: unexpectedly, participants in the rumination condition did not report significantly greater increases in low mood or anxiety (on CES-D or STAI-S scores respectively) over the week than did control participants. However, a non-significant trend towards increased levels of anxiety on the STAI-S for ruminators only did emerge. The absence of an effect of rumination on low mood is at odds with consistent findings in the literature suggesting rumination to play a role in the emergence and maintenance of depressive symptoms, including depression arising following a traumatic event (cf. Nolen-Hoeksema & Morrow, 1991). However, interestingly, the *tendency* towards increased anxiety in ruminators over the week does lend support to previous findings indicating a specific role of rumination upon anxious mood (Nolen-Hoeksema, 2000); a key symptom of PTSD. While rumination has historically been most commonly associated and examined with respect to the depressive disorders - and worry primarily associated with anxiety - the differential role of rumination to that of worry within anxiety augmentation has been highlighted (Fresco et al., 2002). Additionally, evidence from the social anxiety field has indicated a specific role for post-event rumination in disorder

maintenance, through the post-hoc repeated rehearsal (and often subsequent negative evaluation) of past social events (Clark & Wells, 1995; Perini, Abbott & Rapee, 2006). It appears conceivable that post-event rumination may, through a similar vein, play a direct and active role in the maintenance of anxious mood within PTSD; although given the non-significant trend observed here, this is speculated with caution.

Findings for the second hypothesis, with regards to the brief in-session manipulation, were similarly unsupported. Whilst rumination led to increases in fear and sadness, as well as a decline in joviality and serenity, a differential effect of condition was not demonstrated. A possible exception to this was observed on fear ratings, in which rumination appeared to engender non-significant trend-level increases in fear, with no change in fear ratings reported by distraction controls (consistent with trend-level increases in anxiety over the week). Unexpectedly, both groups reported an escalation in sadness, as well as associated reductions in joviality and serenity following task completion. Exploration of gender effects indicated the increases in sadness-ratings to be specific to female participants only; male participants reported no alteration in pre- to post- manipulation ratings with regards to this mood state.

As such, the hypothesized greater detrimental effect of rumination over distraction on mood state pre- to post- manipulation was only partially supported, and is at odds with the findings of previous studies, where rumination has been consistently implicated in the maintenance of negative mood (Ehring, Fuchs & Kläsener, 2009; Ehring, Szeimies, Schaffrick, 2009). Additionally, consideration of the SAM-valence scale indicated no change pre- to post-manipulation for either group; it is possible this measure was not sufficiently sensitive to pick up on these mood-state specific changes. The increase in sadness and decrease in positive mood reported by controls may in part reflect the impact of the selected distraction task on mood (such as through perceived cognitive demand/ task performance), rather than being a failure of the rumination task as such; this consideration will be further explored within the limitations section below.

The finding that rumination led to a tendency towards increased fear *specifically* has not been previously indicated. Zetsche, Ehring & Ehlers (2009)'s experimental study was the first to consider specific mood-state change (that is, fear or sadness rather than 'negative affect' more broadly): the authors found post-video rumination to maintain feelings of sadness specifically - and not fear - a finding attributed to the nature of the analogue stressor used. However, given that the same footage was utilized within this study (and only trend-level significance in fear increases observed), it is difficult to reconcile these contradictory findings and as such, the potential association between rumination and heightened fear

should be interpreted with caution. Nonetheless, the preliminary indication that rumination may have given rise to a resurgence of feelings of fear, perhaps suggests the thinking-process to have prompted internal reminders of the trauma-film (consistent with cognitive models of PTSD, e.g. Ehlers & Clark, 2000). Fear-networking models of emotion (e.g. Foa et al., 1989) propose that the characteristic fear response in PTSD arises from the easy/ chronic activation of the association network laid down during trauma. It appears conceivable that rumination may therefore serve as one such internal trigger by which this emotion is reactivated, although on the basis of this study's results, this possibility warrants further investigation.

4.1.3 Impact of rumination on intrusive experiences

Contrary to the third hypothesis, participants in the rumination condition did not report greater numbers of intrusive images over the course of an extended week-long experimental manipulation than participants in the control condition, even when daily differences between the groups were considered. Similarly, image-distress ratings did not differ between the conditions, indicating phenomenological equivalence within the emotive quality of intrusive memories. While contrary to expectations, this is consistent with findings from two previous experimental studies in which an effect of rumination on intrusive memories was not found (Zetsche, Ehring & Ehlers, 2009; Ehring, Szeimes & Schaffrick, 2009), and suggests that the methodological adaptation of extending the rumination induction did not further elucidate any such association.

This finding was partially consistent with results emerging in relation to the fourth hypothesis, which sought to compare differences in image-experience immediately following the in-session rumination/ distraction induction (and as such, more directly paralleled the format of previous experimental manipulations described in the literature). Perhaps not unexpectedly, given the absence of condition effects over the week, no difference was observed between rumination and control participants with regards to either intrusive image frequency or distress. Similarly, ruminators did not report greater levels of spontaneously-occurring rumination during the two-minute rest period following the experimental manipulation, indicating that induced rumination did not engender the continuation of further spontaneous ruminative thought as hypothesised. However, a difference between the groups emerged regarding levels of image distress following the in-session manipulation, with ruminators reporting significantly greater distress arising with their imagery experiences than control participants. This appears consistent with indications from the literature that the specificity (including image-related distress) is a greater predictor of PTSD severity than frequency of intrusions (Michael, Ehlers & Halligan, 2005), and may, in part, explain the

trend-level increases in fear ratings generated by the rumination task. As outlined above, however, the distress associated with intrusive imagery experiences did not appear to continue over the week, with no difference emerging between the groups.

Consideration of daily image frequency over the week indicated an overall decline in intrusions as the week progressed, perhaps reflecting increased temporal distance from the video. A slight re-escalation towards the end of the week may have arisen as a function of the imminence of the second testing session, consequently prompting reminders of the original footage. In contrast to the apparent stability of intrusive memories in PTSD (potentially as a result of the specific quality of the intrusion; see van der Kolk & Fisler, 1995), the temporal decline in intrusions may reflect the differential nature of intrusive memories within a healthy, non-clinical sample, in which participants do not have personal, first-hand experience of the events being witnessed. Additionally, it was noted that male participants in both conditions reported significantly fewer image experiences over the week than female participants.

Exploratory analysis highlighted that the initial number of intrusive images experienced post-video better predicted total number of images over the week than did allocation to the rumination condition. Similarly, trait rumination was shown to predict total intrusive images irrespective of condition, although unsurprisingly, it was not associated with initial post-video imagery experiences. Instead, perceived unpleasantness of the trauma-film did predict post-video intrusions. This is consistent with suggestions from the literature that intrusions may develop on a continuum of 'stressfulness' (Holmes & Bourne, 2008), with stimuli perceived as high stress - or highly unpleasant - giving rise to a greater number of intrusions. These findings are perhaps indicative of the involvement of differing mechanisms within intrusive imagery *development* (where the perceived aversiveness of the event is perhaps key) as opposed to imagery *maintenance* over the week (influenced by trait factors and degree of initial intrusive experiences).

In line with this, additional analyses highlighted that when unpleasantness ratings of the video were controlled for, the previously observed decline in images over the week disappeared. A potential explanation for this might be that participants reporting low unpleasantness scores would necessarily have had less of a decline due to the lower numbers of images initially experienced at baseline (post-video). Conversely, participants rating the video as highly unpleasant, who as such reported *greater* intrusive experiences at baseline, would therefore present greater opportunity for this decline in imagery to occur. This would

explain why, when the effect of unpleasantness was partialled out through its addition as a covariate to analysis, the previously observed decline in images disappeared.

In sum therefore, individuals' *natural tendency* towards rumination appeared to overshadow any impact of the allocated tasks with regards the maintenance of intrusive imagery. This is in line with indications from previous analogue studies in which *degree* of state rumination (rather than condition) was positively associated with number of intrusive memories (Halligan, Clark & Ehlers, 2002; Zetsche, Ehling & Ehlers, 2009), and is commensurate with results from prospective clinical studies where rumination has been shown to predict symptom severity (e.g. Ehling, Ehlers & Glucksman, 2008; Michael et al., 2007). Similarly, trait rumination and naturalistic post-video levels of state rumination predicted spontaneous post-manipulation ruminative experiences, rather than this emerging as an effect of condition.

4.1.4 Impact of rumination on physiological arousal

Hypotheses concerning the impact of rumination on heart-rate (as an objective measure of physiological arousal) did not appear to be fully supported. Participants in the rumination group did not exhibit greater mean heart-rates during the course of the experimental manipulation (as indexed by increases from baseline) than participants in the control condition. Previous studies have reported mixed findings as to the impact of rumination on heart-rate response: while Ehling, Szeimies & Schaffrick (2009) found rumination to maintain raised heart-rate response to a trauma analogue, Ehling, Fuchs & Kläsener, (2009) did not replicate this result. Our findings suggest that the internal cues provided by rumination were insufficient to induce increased physiological arousal, perhaps consistent with the non-significant (but trend-level) self-reported increases in fear (on the PANAS-X) from the rumination group. Additionally, contrary to expectations, the self-report SAM-arousal measure suggested participants in both conditions to report a subjective *decline* in arousal over the ten-minute period. Again, given that allocation to experimentally-induced rumination may not account for what people actually *do* (when compared to their inherent tendencies) or, similarly, may not accurately reflect 'naturalistic' rumination, caution is needed in interpreting these findings as evidence that an increased arousal state does not occur as a result of ruminative internal processes.

As an adjunct, female participants were observed to demonstrate higher mean heart-rates than male participants during the experimental inductions. This is consistent with a body a literature that has indicated gender differences in cardiac response, with healthy female

participants typically displaying greater heart-rate complexity (Antelmi et al., 2004; Ryan et al., 1994). However, given that this was true both at baseline and during the manipulation, this observation was not further considered in analyses, as it did not pertain directly to the exploration of the aims of this study.

Finally, all participants displayed the characteristic ‘orienting’ deceleration in heart-rate response on presentation of pictorial stimuli, as would be expected from a non-clinical sample (Bradley et al., 2001). Although participants in the rumination condition did not display more marked initial heart-rate decelerations to trauma-relevant than neutral pictures, as previously highlighted in the literature (for example, Bradley et al., 2001), potential differences in heart-rate *acceleration* were noted when baseline between-group differences were considered.

Specifically, ruminators *without* prior exposure to medical settings demonstrated greater heart-rate acceleration on presentation of trauma-related (but not neutral) stimuli than did control participants. This perhaps suggests that the extended rumination induction primed participants towards heightened reactivity over the week, and this finding may be interpreted as preliminary indications as to the role of rumination in stimulus generalization. Whilst not previously considered within an analogue population; this finding is nonetheless consistent with results from the clinical literature, which has indicated PTSD populations to show increased accelerations in heart-rate to trauma-relevant cues only (rather than generally-threatening or emotionally-distressing pictures more generally; Elsesser, Sartory & Tackenberg, 2004; Ehlers et al., 2010). Unexpectedly, participants in the control condition demonstrated greater heart-rate acceleration to neutral pictures, with significantly less acceleration to trauma-related stimuli.

Interestingly, regarding the subgroup of participants *with* prior medical experience, no difference in heart-rate response to trauma or neutral pictures - or between participants in the rumination and control conditions - was observed. This may suggest those participants with previous exposure to medical settings to have displayed a degree of desensitization to such stimuli, perhaps reflecting the likelihood of these individuals having had first-hand experience of scenes of equally (or a more aversive) nature, within a medical setting.

4.1.5 Consideration of gender effects

While gender differences have not been routinely considered in the literature, Zetsche, Ehring & Ehlers (2009) did observe male participants in the rumination condition to report

significantly greater numbers of intrusive memories than reported by female participants. Interpreted with some caution by the authors, this was potentially attributable to task compliance, although a qualitative distinction between male and female processing styles was also considered. Although an effect of gender was also observed in this study, it was consistent across both conditions, with male participants reporting fewer intrusive images over the week than female participants. Similarly, although no differences between the genders emerged with respect to number of images reported following the in-session manipulation, male participants did report a lesser degree of spontaneous state rumination than female participants during this period. Male participants were also less likely to report increases in sadness following the experimental manipulation.

Exploratory analysis indicated these differences were not attributable to male participants having experienced less of an initial emotional response to the video than female participants (as evidenced by comparable unpleasantness ratings, valence ratings and physiological responses to the trauma-film), or having paid less attention to the footage. In sum, as these gender effects occurred across both conditions, it may be the case that male participants were less likely to either notice, and/or attend to, such processes arising (perhaps as a function of limited distress); or were perhaps less willing to report intrusive experiences as they occurred. However, given the lower number of male participants in this study ($n = 18$; 22%) compared to female participants ($n = 64$; 78%) - primarily attributable to lower male response rates during initial stages of the recruitment process - the gender comparisons undertaken here are likely to be underpowered, and as such any potential differences between the groups on these variables may not have been adequately detected. The likelihood of each of these factors can therefore only be speculated, and no firm conclusions regarding gender differences can be drawn on the basis of this data.

4.2 Limitations of the present study

Whilst these results offer partial support to the hypothesized role of rumination in PTSD symptom maintenance (most notably perhaps with regards the potential influence of trait factors), a number of limitations are worthy of consideration. Firstly, the general constraints of the trauma-film paradigm should be noted. Due to ethical considerations, a non-clinical sample was necessarily used to induce symptom replication: as such, the generalisability of any findings to a PTSD population should be approached with caution. Similarly, although the analogue and diary paradigm is now a relatively well-accepted methodology within experimental trauma research (Holmes & Bourne, 2008); the extent to which induced

rumination or distraction can adequately parallel the ‘real-life’ phenomena remains to be established. Nonetheless, this study sought to respond to this concern by making adaptations to previous methodological designs and by extending the manipulation of interest to a one-week period.

Secondly, despite efforts to consider the effect sizes of previous research in calculating power for the current study - and its comparable sample size ($n = 83$) to other experimental designs in the area (e.g. Ehring, Szeimies & Schaffrick, 2009; Zetsche, Ehring & Ehlers, 2009) - the non-significant trends observed on certain mood variables potentially suggest the study to have been underpowered. In line with this, results were not equally supportive for all dependent variables, nor uniformly consistent on consideration of the one-off vs. week-long experimental manipulations. An extended rumination period did not lead to changes in low mood as hypothesised; nor clear effects of condition found with other mood states following the first task induction. In a similar vein, no experimental effect was found regarding numbers of intrusive images at either time point. However, the trends observed for increased anxious mood over the week, and the increase in fear in-session (when compared to the effects of distraction), may indicate further investigation to be of value. Whether this reflects a differential impact of rumination on specific symptomatology; is attributable to the inherent qualities of the experimental tasks completed; or suggests the observed trends to be erroneous, remains unclear. As such, these findings do need to be interpreted with caution and replicated within future research using a larger sample size - and with greater equity within numbers of male and female participants - before firm conclusions can be drawn.

Thirdly, the nature of the individual rumination and distraction tasks themselves deserve consideration. While rumination appeared to engender mood change in the expected direction during the in-session manipulation, the difference between the groups was not significant: of note, it was observed that the distraction task also unexpectedly induced sadness and a significant decline in positive affect. Given that this distraction induction comprised a series of cognitive exercises, conceptualised with the need to provide equitable attentional and verbal demand to that required by the rumination task - and that this was the first occasion on which participants were completing the induction - it is possible that task demand prompted feelings of performance anxiety and subjective evaluation, despite explicit instructions that there were in fact no correct responses.

Similarly, any explanation for an absence of findings with regards certain dependent variables should necessarily consider the degree of task compliance. While manipulation checks indicated task adherence to be high (both over the week and in-session), and therefore

theoretically indicating the type of processing undertaken by each group to be qualitatively different; in reality, this is largely reliant on self-report, and does not necessarily account for degree of task engagement - particularly over a prolonged period, in which similar tasks were asked to be completed each day. With regards the latter, it was observed that ruminators rated their allocated themes over the week as low in personal relevance overall, in spite of attempts to match ascribed cues to those idiosyncratic spontaneous thoughts arising during and immediately after the video. It has been suggested that the ease with which intrusive memories are triggered might be dependent on degree of personal distress (Michael, 2000); as such, the low perceived personal relevance of the rumination cues might in part account for an absence of an effect on this variable.

4.3 Theoretical implications

Overall therefore, the primary hypotheses regarding the role of *induced* state rumination upon the affective states and intrusive experiences characteristic of PTSD symptomatology were not generally supported (with the exception of certain non-significant trends). Some support for the differential impact of rumination on physiological arousal was observed with regards accelerative heart-rate response to trauma reminders. However, of particular interest perhaps, are the findings suggestive that *trait* rumination was associated with intrusive imagery experiences over the week (when no between-group effects were observed). As such, the current research provides preliminary evidence for the greater contribution of trait factors regarding a ruminatory thinking-style in symptom maintenance over induced state rumination, within the context of an analogue design. This is consistent with correlational evidence emerging from analogue studies of a clearer association between *degree* of state rumination and intrusive experiences (e.g. Zetsche, Ehling & Ehlers, 2009). To date, the role of trait rumination upon PTSD symptomatology has received less attention in the analogue study literature. However, it appears logical that trait levels may better predict the likelihood with which individuals go on to engage in prolonged periods of state rumination, over and above the degree which can be reliably induced within the context of a laboratory setting.

As such, these elements arguably lend further support to the proposition that rumination serves as an active mechanism through which PTSD symptoms are maintained, consistent with the cognitive model outlined by Ehlers & Clark (2000). It is of note that this remains one of the few models of PTSD to specifically identify rumination as a key maintaining process. Within this, rumination is conceptualised as a cognitive strategy used by individuals in order to control their symptoms. Specifically, the model proposes that rumination may a)

serve to strengthen negative appraisals of the trauma via repeated rehearsal, b) promote cognitive and experiential avoidance via its abstract style (e.g. ‘what if...?’ questions), rather than enabling processing of the actual trauma experience (consistent with evidence suggesting rumination to result in overgeneral memory recall; e.g. McNally et al., 1995), c) directly increase feelings of dysphoria, nervous tension and hopelessness, and finally, d) provide internal retrieval cues that increase intrusive memory experiences. Whilst this project did not seek to examine the interaction between rumination and idiosyncratic negative appraisals of the trauma-event, this study’s findings may be seen to offer tentative support to the role of rumination in maintaining intrusive imagery experiences – when trait factors over and above induced rumination were taken into account. Commensurate with the model, this study’s findings also suggest rumination to engender physiological responsiveness to trauma-relevant cues (alongside a possible tendency towards anxiety/fear). However, given the absence of hypothesized between-group effects for intrusive memories, it is possible that an alternative interpretation of these findings - consistent with the cognitive avoidance hypothesis of rumination - is that attempts to avoid reminders of the trauma nevertheless unintentionally impact upon anxious mood state.

Tentative indications that rumination may have led to a specific re-activation of fear (typically the primary emotion experienced during trauma) and image-specific distress, may be consistent with models suggesting rumination as instrumental in evoking internal retrieval cues (Ehlers & Clark, 2000). Whilst a fear response was not supported by an objective measure of physiological arousal during the experimental manipulation, the heightened reactivity to trauma-cues displayed by ruminators only a week later (in participants without medical experience) was consistent with theories indicating fear to generalize to related cues, and may additionally reflect the tendency towards heightened anxiety of ruminators over the week (e.g. fear-network theory, Foa et al. 1989; Ehlers & Clark, 2000).

4.4 Clinical Implications

The key finding that trait rumination served as a predictor of intrusive memory maintenance holds important potential implications for clinical practice. In particular, trait measures may serve to inform greater specificity within post-trauma screening and assessment procedures: an evaluation of the degree to which an individual is predisposed to (or ‘at risk’ of) engaging in this maladaptive cognitive process may help identify those at greater risk of symptom persistence and chronic PTSD. Questionnaire measures provide an easily administrable and time-efficient assessment route, if further research within clinical samples were to implicate

trait rumination specifically in disorder severity and chronicity. In turn, the potential exists to consider earlier, tailored interventions aimed at addressing rumination as a maintenance factor. Additionally, indications from this study that rumination heightened physiological reactivity to reminders of trauma (alongside evidence from the literature that PTSD patients show increased reactivity to trauma-cues; Ehlers et al., 2010) may suggest an additional role for psychophysiological screening post-trauma. This may enable identification of those individuals at greatest risk of persistent physiological arousal (consistent with DSM-IV criteria for PTSD). It is evident that further research is needed in order to clarify the role of the above variables in symptom persistence, and subsequently the potential clinical utility of any such screening tools.

With regards intervention, current guidelines for clinical treatment of PTSD recommend Trauma-Focused CBT (TF-CBT) as the gold standard (NICE Guideline 26; 2005), an approach based predominantly on the Ehlers & Clark (2000) cognitive model. In particular, TF-CBT has been indicated to lead to improvements in symptoms of PTSD, depression and anxiety; to have high acceptability with patients; and for treatment gains to be maintained at 6-month follow-up (Ehlers et al., 2005). Within treatment, a dominant focus is given to modifying the negative appraisals of the trauma and its sequelae, often exercised in conjunction with the imaginal reliving process; to the elaboration and correction, if necessary, of the trauma memory; to the discrimination of environmental triggers; and to the identification and modification of dysfunctional behaviours and coping strategies. As such, the current cognitive treatment protocol does indicate rumination as a potential factor to be addressed, were idiosyncratic assessment and formulation to highlight it as a dysfunctional coping strategy. Nonetheless, our partial theoretical knowledge regarding the exact mechanisms by which rumination exacerbates symptom presentation potentially serves as a limiting factor for therapeutic intervention.

Yet regardless of the manner by which rumination might maintain symptoms, the gradually accumulating evidence-base - from both the clinical and experimental arenas - to suggest its implication advocates for the increased prominence of rumination intervention within existing PTSD treatment protocols. Within the depression field, prospective and cross-sectional studies have consistently highlighted the role of rumination in disorder duration, severity and relapse (Just & Alloy, 1997; Fava, 1999; Judd et al., 1999; Nolen-Hoeksema, 2000), as well as its association with decreased responsiveness to cognitive-behavioural intervention for depression (Ciesla & Roberts, 2002). Consequently, these findings have led to the development and evaluation of greater rumination-focused approaches than championed by traditional Beckian CBT. Pending further replication of findings to indicate

the role of rumination in PTSD-disorder maintenance *specifically*, future developments within clinical interventions for trauma may serve to benefit from the greater functional-analytic and process-oriented approaches emerging to address other psychiatric disorders - such as depression - in which rumination has been highlighted as key.

One such example is that of rumination-focused cognitive behavioural therapy (RF-CBT; Watkins et al., 2007), developed to address the core residual symptoms of depression. RF-CBT not only incorporates the specific functional-analytic approach to depression favoured by behavioural activation (BA), but also outlines a number of imagery-based and experiential exercises to facilitate a shift in thinking-style. In particular, specific functional analysis of rumination seeks to highlight the helpful (concrete and specific) versus unhelpful (abstract and evaluative) ways of thinking about problems; associated problematic patterns of behaviour (such as procrastination) and potential counter-rumination behaviours (such as effective task engagement). Treatment seeks to help patients to recognize triggers for rumination; to develop alternative strategies; and encourages self-compassion. As such, the approach advocates a greater emphasis on modifying the *process* of thinking rather than the specific thought content. While there is some preliminary evidence to suggest its utility within depression (Watkins et al., 2007), no studies have yet sought to evaluate its potential relevance to the PTSD field.

As noted within the Ehlers & Clark (2000) model, beliefs regarding the value of rumination may additionally serve to maintain its selection as a strategy (for example, via attempts to 'make sense' of the traumatic event). In line with this, the function of rumination has received greater attention within the metacognitive therapy approach (MCT; Wells, 2000), in which the co-existing positive and negative beliefs about the process of rumination held by the individual are examined and addressed (e.g. positive belief: 'I must remember everything that happened in order to prevent it happening again'; negative belief: 'If I keep thinking about the trauma I'll go crazy'). As such, the individual continues to believe the rumination strategy to be highly necessary, yet remains simultaneously distressed by engagement in the process. Originally developed in the context of worry (Wells, 2000), the authors have recently trialed the MCT approach for the treatment of chronic PTSD (Wells & Sembi, 2004). Contrary to the CBT model of PTSD treatment (Ehlers et al., 2005), MCT does not draw on the processes of exposure, imaginal reliving, or challenging beliefs about the trauma in order to alleviate distress. Instead, its focus relates primarily to the modification of the maladaptive processes of worry, rumination and attention in order that functional emotional processing can subsequently take place. Despite the relatively small sample size used, an open trial of MCT for chronic PTSD nonetheless provided preliminary evidence for the

approach, with significant treatment gains regarding levels of PTSD, anxiety and depression immediately post-treatment maintained at 3- and 6-month follow-up (Wells et al., 2008).

Finally, transdiagnostic ideas from mindfulness-based cognitive therapy (MBCT; Segal, Williams & Teasdale, 2002) and acceptance commitment therapy (ACT; Hayes, Strosahl & Wilson, 1999) approaches, for example, conceptualise the engagement and entanglement with thought-content typical of rumination as detrimental to mood state (Ramel et al., 2004). By becoming aware of this ‘ruminative mode’ at an early stage and in a non-judgmental way, it is proposed that individuals can learn to de-centre from such patterns, preventing a resurgence in depressive mood (Rae & Williams, 2010). Within the trauma field, these ideas have gained greater momentum in recent years, particularly perhaps with regards the concept of willingness to experience emotional distress as a result of suffering (in the PTSD context: trauma). If rumination is conceptualised as a form of cognitive and indeed experiential avoidance, then the acceptance of experience and resulting emotional states, mindful detachment from ruminative thought, self-acceptance, and compassion may also be useful principles and skills on which to base PTSD treatment (Follette, Palm & Pearson, 2006). Empirical support for ACT and MBCT approaches within the PTSD domain remains limited (Batten & Hayes, 2005; Orsillo & Batten, 2005).

The emerging third-wave treatment approaches, in which rumination has played a more focal role, can therefore be broadly clustered into three approaches: approaches in which the process and function of thinking (rather than content) is addressed (e.g. RF-CBT); approaches in which detachment to this process is explicitly emphasised (e.g. MBCT or ACT) and approaches in which the *beliefs* about the process of rumination are modified (e.g. MCT). Certainly, despite differing theoretical and clinical emphases, the therapeutic approaches outlined above are not necessarily incompatible with the current treatment protocol for PTSD, and as such might be usefully incorporated into current clinical practice. Of course, the utility and efficacy of adapting such protocols to address post-event rumination as occurs within PTSD *specifically* remains to be established, given the relative paucity of specific trauma-related research in this domain.

4.5 Directions of future research

In conclusion, the findings presented here can be tentatively interpreted as adding to the accumulating evidence-base with regards to the role of rumination in maintaining PTSD symptoms. First and foremost, given the mixed results for the effects of state rumination on differential dependent variables, the replication of findings utilizing this extended methodology within analogue populations is indicated. In particular, future experimental studies should perhaps seek to address a key limitation observed within the present study, notably finding a more successful way of increasing the personal relevance of the rumination cues presented to engender state rumination. One option might be to encourage participants to directly relate the cues to their own life, with explicit instructions to ruminate on the likelihood and/or potential consequences of such an event happening to them. Of note, due to the constraints of this project, only selected PTSD symptoms were selected for examination: the impact of rumination on behavioural avoidance and other related safety-behaviours were not considered, and may provide useful additions to our understanding of other forms of symptom maintenance in the future.

Whilst examination of the factors that might lead individuals to select rumination as a strategy in the first place are outside the remit and scope afforded by this project (a range of pre-morbid trait tendencies, or metacognitive appraisals, for example), it would be useful for further research to consider these in greater depth. Given the preliminary indications from this study regarding the impact of trait rumination on intrusive images, a greater focus should arguably be given to examining the impact of trait rumination over and above the effects of state rumination that can be induced within such a paradigm. Additionally, as posed by both the Ehlers & Clark (2000) model and the metacognitive approach (Wells, 2000; Wells & Sembi, 2004), future research should seek to further understand the role of beliefs about the use of rumination, both in analogue and clinical samples. The prospective clinical studies that have sought to examine this have indicated a mixed evidence-base; while Michael et al. (2007) did not find negative metacognitive assumptions to be predictive of PTSD severity at 6-month follow-up; preliminary support for the role of metacognitions in PTSD (Wells, 2000) and treatment efficacy (Wells et al., 2008) is emerging.

Finally, greater examination of PTSD-specific state rumination (and trait factors) using clinical samples will allow for the generalisability of findings emerging from the trauma-analogue paradigm to be assessed, with an ultimate aim of informing PTSD interventions in which a rumination-focus is more centrally defined. Clinical trials evaluating the efficacy of process-oriented approaches, particularly with regards the applicability of acceptance-based

models, including mindfulness, to address PTSD-specific rumination are needed in the future - especially given indications from other fields (depression; anxiety) as to their utility in redressing repetitive thought processes. This study sought to serve as a preliminary and exploratory step towards this future goal, via the provision of further evidence for the role of rumination in the maintenance of PTSD-symptomatology.

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APPENDIX A: Letter confirming ethical approval

Khodayar Shahriyarmolki and Kristen Warnock
Department of Psychology
PO78
3rd Floor, Addiction Sciences Building
Institute of Psychiatry
4 Windsor Walk
De Crespigny Park
LONDON SE5 2AF

18 March 2011

Dear Khodayar and Kristen

PNM/10/11-47 A study on the effects of thinking style on emotional processing.

Thank you for sending in the amendments requested to the above project. I am pleased to inform you that these meet the requirements of the PNM RESC and therefore that full approval is now granted with the following proviso:

1. Please ensure the Information Sheet makes it clear that participants can only withdraw their data up to the point of publication, after which point their data cannot be withdrawn.

Please ensure that you follow all relevant guidance as laid out in the King's College London Guidelines on Good Practice in Academic Research (<http://www.kcl.ac.uk/college/policyzone/index.php?id=247>).

For your information ethical approval is granted until **18 March 2012**. If you need approval beyond this point you will need to apply for an extension to approval at least two weeks prior to this explaining why the extension is needed, (please note however that a full re-application will not be necessary unless the protocol has changed). You should also note that if your approval is for one year, you will not be sent a reminder when it is due to lapse.

If you do not start the project within three months of this letter please contact the Research Ethics Office. Should you need to modify the project or request an extension to approval you will need approval for this and should follow the guidance relating to modifying approved applications: <http://www.kcl.ac.uk/research/ethics/applicants/modifications.html>

Any unforeseen ethical problems arising during the course of the project should be reported to the approving committee/panel. In the event of an untoward event or an adverse reaction a full report must be made to the Chairman of the approving committee/review panel within one week of the incident.

Please would you also note that we may, for the purposes of audit, contact you from time to time to ascertain the status of your research.

If you have any query about any aspect of this ethical approval, please contact your panel/committee administrator in the first instance (<http://www.kcl.ac.uk/research/ethics/contacts.html>). We wish you every success with this work.

With best wishes

Yours sincerely

Jim Summers
Research Ethics Team Leader

c.c.
Professor Anke Ehlers

Dr Richard Stott

APPENDIX B: Information Sheet for Participants

INFORMATION SHEET FOR PARTICIPANTS

REC Reference Number: **PNM/10/11-47**



YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

A study on the effects of thinking style on emotional processing

We would like to invite you to participate in this DClinPsy research project. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

- **What is the purpose of the study?**

The purpose of the study is to investigate the effects of different thinking styles on emotional processing of distressing video footage. We are hoping that the results of this study may help improve the treatment for people suffering from emotional problems having experienced a stressful event e.g. an accident.

- **Who is eligible to participate?**

We are looking for volunteers who speak English as a first language, and who are aged 18 and over. Unfortunately, we cannot include people who have a history of severe mental health problems, or who are currently receiving any mental health treatment. Due to the nature of this study, we also are not able to include anyone with a history of traumatic experiences or previous involvement in a serious road traffic accident, history of brain damage or stroke, current neurological disorder, diabetes or substance misuse.

- **What will happen if I am selected and agree to take part?**

If you decide to take part in the study, you will first be asked to complete a brief telephone screen and to fill in some questionnaires which will be sent to you one week before the experiment will take place. The questionnaires will ask about your personal demographics, past experiences of well-being, style of thinking and current mood. Filling in these questionnaires will take about 15 minutes.

The experiment itself will take place over a one-week period, with two testing sessions a week apart.

During the first session you will be first asked to complete a brief series of neuropsychological tests, which are similar to solving puzzles. You will then be asked to watch video clips of traffic situations and the aftermath of traffic accidents, including emergency service personnel working to rescue injured people from cars and moving dead bodies. You may find parts of these scenes distressing.

After watching the video, you will be presented with a series of questions, and asked to think about them in a certain way. You will be asked to do this on a couple of occasions. During parts of the experiment your heart rate will be measured. You will also be asked to rate your mood several times during the session, and to fill in some further questionnaires. This first session will last approximately two hours in total.

During the week following the first session you will be asked to complete a daily task, involving listening to sentences pre-recorded on a MP3 player, and to answer a few questions in writing throughout the day including a daily diary about the task, and mood questionnaires. This task should take approximately 15 minutes a day.

We will ask you to return for the second session seven days later. Your daily diary over the week and mood questionnaires will be collected at the start of the session. You will then be shown a series of pictures, and asked about your emotional response to them. Again, your heart rate will be measured during parts of this session and you will be asked to complete further questionnaires. This second session will last approximately 45 minutes.

In total, this experiment is expected to take approximately 5 hours of your time. If you do take part in our study, we will pay you £40 as a reimbursement for your time and travel expenses. This will be paid on completion of the second session. Unfortunately, payment for completion of part of the study only cannot be given.

- **Are there any risks?**

The risks in this study are minimal. However, some people may find watching some of the video clips, or thinking about them, to be somewhat distressing. In case you were to feel very distressed, you can stop the task anytime and withdraw from the study. You would have the opportunity to further discuss with the experimenter your feelings of distress either by phone or in person, at any point after your withdrawal.

- **Possible benefits**

Since the study is for research purposes only, it is unlikely that you will benefit directly from taking part in this study. You will however be informed about the purposes of the research and the ideas behind it after you have completed it.

- **Will my taking part in this study be kept confidential?**

The information you provide will be treated as strictly confidential and anonymous. Notes will be stored in lockable filing cabinets. All materials will be given a unique code that will be used in all subsequent data analysis. No record will be kept linking your name with the code. Only the investigators (Khodayar Shahriyarmolki and Kristen Warnock), and Principal Investigators (Dr Richard Stott and Professor Anke Ehlers) will have access to your data.

It is up to you to decide whether to take part or not. If you decide to take part you are still free to withdraw yourself and your data at any time and without giving a reason. In this instance, all your data from participation will be destroyed.

- **For further advice and information about the study, please contact:**

Kristen Warnock/ Khodayar Shahriyarmolki (Chief Investigators)
Department of Psychology PO78
Addiction Sciences Building, 3rd Floor
Institute of Psychiatry
4 Windsor Walk
London SE5 2AF
Tel. 0207 848 0223/4

- **If this study has harmed you in any way you can contact King's College London using the details below:**

Dr Richard Stott/ Professor Anke Ehlers (Principal Investigators)
Henry Wellcome Building PO77
Department of Psychology
Institute of Psychiatry
De Crespigny Park
London SE5 8AF
Tel: 020 7848 5033

APPENDIX C: Consent form for participants

CONSENT FORM FOR PARTICIPANTS IN RESEARCH STUDIES

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.



Title of Study: A study on the effects of thinking style on emotional processing

King's College Research Ethics Committee Ref: *PNM/10/11-47*

Thank you for considering taking part in this research. The person organising the research must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

Please tick
or initial

- I understand that if I decide at any time during the research that I no longer wish to participate in this project, I can notify the researchers involved and withdraw from it immediately without giving any reason. Furthermore, I understand that I will be able to withdraw my data up to the point of publication. ☐
- I consent to the processing of my personal information for the purposes explained to me. I understand that such information will be handled in accordance with the terms of the Data Protection Act 1998. ☐

Participant's Statement:

I _____

agree that the research project named above has been explained to me to my satisfaction and I agree to take part in the study. I have read both the notes written above and the Information Sheet about the project, and understand what the research study involves.

Signed

Date

Investigator's Statement:

I _____

confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the participant.

Signed

Date

APPENDIX D: Measures

Perseverative Thinking Questionnaire (PTQ-Trait version; see Ch. 2.6.1)

How do you typically think about negative experiences or problems? Please read the following statements and rate how much they apply to you when you think about negative experiences or problems.

		Never	Rarely	Sometimes	Often	Almost always
1.	The same thoughts keep going through my mind again and again.	0	1	2	3	4
2.	Thoughts intrude into my mind.	0	1	2	3	4
3.	I can't stop dwelling on them.	0	1	2	3	4
4.	I think about many problems without solving any of them.	0	1	2	3	4
5.	I can't do anything else while thinking about my problems.	0	1	2	3	4
6.	My thoughts repeat themselves.	0	1	2	3	4
7.	Thoughts come to my mind without me wanting them to.	0	1	2	3	4
8.	I get stuck on certain issues and can't move on.	0	1	2	3	4
9.	I keep asking myself questions without finding an answer.	0	1	2	3	4
10.	My thoughts prevent me from focusing on other things.	0	1	2	3	4
11.	I keep thinking about the same issue all the time.	0	1	2	3	4
12.	Thoughts just pop into my mind.	0	1	2	3	4
13.	I feel driven to continue dwelling on the same issue.	0	1	2	3	4
14.	My thoughts are not much help to me.	0	1	2	3	4
15.	My thoughts take up all my attention.	0	1	2	3	4

Perseverative Thinking Questionnaire (PTQ-State version; see Ch. 2.6.1)

The statements below refer to thoughts to do with the events in the video footage (or thoughts that were triggered by the footage). Please think back to the two minute break after the video, and circle the appropriate answer.

		Never	Rarely	Sometimes	Often	Almost always
1.	The same thoughts kept going through my mind again and again.	0	1	2	3	4
2.	Thoughts intruded into my mind.	0	1	2	3	4
3.	I couldn't stop dwelling on them.	0	1	2	3	4
4.	I thought about many issues without solving any of them.	0	1	2	3	4
5.	I couldn't do anything else while thinking about these issues.	0	1	2	3	4
6.	My thoughts repeated themselves.	0	1	2	3	4
7.	Thoughts came to my mind without me wanting them to.	0	1	2	3	4
8.	I got stuck on certain issues and couldn't move on.	0	1	2	3	4
9.	I kept asking myself questions without finding an answer.	0	1	2	3	4
10.	My thoughts prevented me from focusing on other things.	0	1	2	3	4
11.	I kept thinking about the same issue all the time.	0	1	2	3	4
12.	Thoughts just popped into my mind.	0	1	2	3	4
13.	I felt driven to continue dwelling on the same issue.	0	1	2	3	4
14.	My thoughts were not much help to me.	0	1	2	3	4
15.	My thoughts took up all my attention.	0	1	2	3	4

Ruminative Responses Scale (RRS; see Ch. 2.6.2)

People think and do many different things when they feel depressed. Please read each of the items below and indicate whether you never, sometimes, often or always think or do each one when you feel down, sad, or depressed.

Please indicate what you generally do, not what you think you should do.

	Never	Sometimes	Often	Always
1. I think about how alone I feel.	1	2	3	4
2. I think about my feelings of fatigue and achiness.	1	2	3	4
3. I think about how hard it is to concentrate.	1	2	3	4
4. I think about how passive and unmotivated I feel.	1	2	3	4
5. I think "Why can't I get going?"	1	2	3	4
6. I think about a recent situation, wishing it had gone better.	1	2	3	4
7. I think about how sad I feel.	1	2	3	4
8. I think about all my short-comings, failings, faults and mistakes.	1	2	3	4
9. I think about how I don't feel up to doing anything.	1	2	3	4
10. I think "Why can't I handle things better?"	1	2	3	4

Penn State Worry Questionnaire (PSWQ; see Ch. 2.6.3)

Rate each of the following statements on a scale of 1 ("not at all typical of me") to 5 ("very typical of me"). Please do not leave any items blank.

	Not at all typical of me		Some what typical of me		Very typical of me
1. If I do not have enough time to do everything, I do not worry about it.	1	2	3	4	5
2. My worries overwhelm me.	1	2	3	4	5
3. I do not tend to worry about things.	1	2	3	4	5
4. Many situations make me worry.	1	2	3	4	5
5. I know I should not worry about things, but I just cannot help it.	1	2	3	4	5
6. When I am under pressure I worry a lot.	1	2	3	4	5
7. I am always worrying about something.	1	2	3	4	5
8. I find it easy to dismiss worrisome thoughts.	1	2	3	4	5
9. As soon as I finish one task, I start to worry about everything else I have to do.	1	2	3	4	5
10. I never worry about anything.	1	2	3	4	5
11. When there is nothing more I could do about a concern, I do not worry about it any more.	1	2	3	4	5
12. I have been a worrier all my life.	1	2	3	4	5
13. I notice that I had been worrying about things.	1	2	3	4	5
14. Once I start worrying, I cannot stop.	1	2	3	4	5
15. I worry all the time.	1	2	3	4	5
16. I worry about projects until they are all done.	1	2	3	4	5

State-Trait Anxiety Inventory (STAI-T; see Ch. 2.6.4)

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe best how you generally feel.

		Not at all	Somewhat	Moderately so	Very much so
1.	I feel pleasant.	1	2	3	4
2.	I feel nervous and restless.	1	2	3	4
3.	I feel satisfied with myself.	1	2	3	4
4.	I wish I could be as happy as others seem to be.	1	2	3	4
5.	I feel like a failure.	1	2	3	4
6.	I feel rested.	1	2	3	4
7.	I am "calm, cool, and collected".	1	2	3	4
8.	I feel that difficulties are piling up so that I cannot overcome them.	1	2	3	4
9.	I worry too much over something that doesn't really matter.	1	2	3	4
10.	I am happy.	1	2	3	4
11.	I have disturbing thoughts.	1	2	3	4
12.	I lack self-confidence.	1	2	3	4
13.	I feel secure.	1	2	3	4
14.	I make decisions easily.	1	2	3	4
15.	I feel inadequate.	1	2	3	4
16.	I am content.	1	2	3	4
17.	Some unimportant thought runs through my mind and bothers me.	1	2	3	4
<hr/>					
		Not at all	Somewhat	Moderately so	Very much so
18.	I take disappointments so keenly that I can't put them out of my mind.	1	2	3	4
19.	I am a steady person.	1	2	3	4
20.	I get in a state of tension or turmoil as I think over my recent concerns and interests.	1	2	3	4

State-Trait Anxiety Inventory (STAI-S; see Ch. 2.6.4)

Read each statement and select the appropriate response to indicate how you have generally felt, OVER THE LAST WEEK. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you have generally felt.

		Not at all	Somewhat	Moderately so	Very much so
1.	I have felt calm.	1	2	3	4
2.	I have felt secure.	1	2	3	4
3.	I have felt tense.	1	2	3	4
4.	I have felt strained.	1	2	3	4
5.	I have felt at ease.	1	2	3	4
6.	I have felt upset.	1	2	3	4
7.	I have been worrying over possible misfortunes.	1	2	3	4
8.	I have felt satisfied.	1	2	3	4
9.	I have felt frightened.	1	2	3	4
10.	I have felt uncomfortable.	1	2	3	4
11.	I have felt self-confident.	1	2	3	4
12.	I have felt nervous.	1	2	3	4
13.	I have felt jittery.	1	2	3	4
14.	I have felt indecisive.	1	2	3	4
15.	I have been relaxed.	1	2	3	4
16.	I have felt content.	1	2	3	4
17.	I have been worried.	1	2	3	4
18.	I have felt confused.	1	2	3	4
19.	I have felt steady.	1	2	3	4
20.	I have felt pleasant.	1	2	3	4

Centre for Epidemiological Studies Depression Scale (see Ch. 2.6.5)

Circle the number of each statement which best describes how often you felt or behaved this way - DURING THE PAST WEEK.

DURING THE PAST WEEK...		Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of the time (3-4 days)	Most or all of the time (5-7 days)
1.	I was bothered by things that don't usually bother me.	0	1	2	3
2.	I did not feel like eating; my appetite was poor.	0	1	2	3
3.	I felt that I could not shake off the blues even with help from my family and friends.	0	1	2	3
4.	I felt that I was just as good as other people.	0	1	2	3
5.	I had trouble keeping my mind on what I was doing.	0	1	2	3
6.	I feel depressed.	0	1	2	3
7.	I felt that everything I did was an effort.	0	1	2	3
8.	I felt hopeful about the future.	0	1	2	3
9.	I thought my life had been a failure.	0	1	2	3
10.	I felt fearful.	0	1	2	3
11.	My sleep was restless.	0	1	2	3
12.	I was happy.	0	1	2	3
13.	I talked less than usual.	0	1	2	3
14.	I felt lonely.	0	1	2	3
15.	People were unfriendly.	0	1	2	3
16.	I enjoyed life.	0	1	2	3
17.	I had crying spells.	0	1	2	3
18.	I felt sad.	0	1	2	3
19.	I felt that people really disliked me.	0	1	2	3
20.	I could not get 'going'.	0	1	2	3

General Information Questionnaire (see Ch. 2.6.6)

The following questions ask about you and your life in general. For each question, either write the answer on the line or tick the box which most applies to you. Some questions may have more than one answer.

1. Date of birth	____/____/____
2. Gender	<input type="checkbox"/> male <input type="checkbox"/> female
3. Ethnic background	<input type="checkbox"/> Caucasian <input type="checkbox"/> Black (Caribbean, African, Other) <input type="checkbox"/> Pacific Asian <input type="checkbox"/> Indian/Pakistani/Bangladeshi <input type="checkbox"/> Other _____
4. Is English your first language?	<input type="checkbox"/> Yes <input type="checkbox"/> No. Which is your first language? _____
5. What is your marital status?	<input type="checkbox"/> single <input type="checkbox"/> divorced/separated <input type="checkbox"/> married <input type="checkbox"/> widowed
6. Are you	<input type="checkbox"/> employed full-time <input type="checkbox"/> a full-time student <input type="checkbox"/> employed part-time <input type="checkbox"/> a part-time student <input type="checkbox"/> self-employed <input type="checkbox"/> unemployed <input type="checkbox"/> a homemaker <input type="checkbox"/> retired <input type="checkbox"/> other: _____
7. Please mark any qualifications you have.	<input type="checkbox"/> No exams <input type="checkbox"/> Degree <input type="checkbox"/> GCSE/O Levels <input type="checkbox"/> Postgraduate degree <input type="checkbox"/> A Levels <input type="checkbox"/> Professional qualification <input type="checkbox"/> Other: _____

Please answer the questions below.

1. Have you ever worked in a medical setting (e.g. as a nurse or paramedic)?

☐ Yes ☐ No

If yes, please specify what you did and how long you did it for:

.....
.....

2. Please estimate how much time you spend watching medical programs (e.g. "ER", "Casualty", etc) or films involving gore or violence.

_____ hours / month

3. Do you have a driving licence?

☐ Yes ☐ No

3b. If so, how often do you drive?

☐ Never
☐ Less than 1/month ☐ 1-5 times/month
☐ 1-5 times/week ☐ Every day

4. Do you ride a motorbike?

☐ Yes ☐ No

4b. If so, how often do you ride?

☐ not currently
☐ less than 1/month ☐ 1-5 times/month
☐ 1-5 times/week ☐ every day

5. Do you ride a bicycle?

☐ Yes ☐ No

5b. If so, how often do you ride?

☐ Not currently
☐ Less than 1/month ☐ 1-5 times/month
☐ 1-5 times/week ☐ Every day

6. What mode of transport do you use the most often?

☐ Car (as driver or as passenger)
☐ Motorbike ☐ Walking
☐ Bicycle ☐ Public transport

7. Are you currently taking any medication?

☐ No
☐ Yes, please indicate name(s) and daily doses:

.....
.....
.....
.....
.....
.....
.....

Psychoactive screen (see Ch. 2.6.7)

This session requires your heart rate to be monitored throughout. The heart rate readings may be affected by consumption of certain substances. Please answer the following as truthfully as possible. Your responses will NOT affect your inclusion in the study.

1. Have you consumed coffee or tea during the past two hours?	<input type="checkbox"/> No <input type="checkbox"/> Yes, please indicate how much:
2. Have you taken any medication during the past two hours?	<input type="checkbox"/> No <input type="checkbox"/> Yes, please indicate what kind of medication (<i>if possible, please also state the dosage</i>):
3. Have you consumed alcohol during the past 24 hours?	<input type="checkbox"/> No <input type="checkbox"/> Yes, please indicate what you had and how much:
4. Have you taken any drugs during the past 24 hours?	<input type="checkbox"/> No <input type="checkbox"/> Yes, please indicate what you had and how much:
5. Have you smoked any cigarettes during the past two hours?	<input type="checkbox"/> No <input type="checkbox"/> Yes, please estimate how many:

Positive and Negative Affect Scale-Expanded Form (PANAS-X; see Ch. 2.6.8)

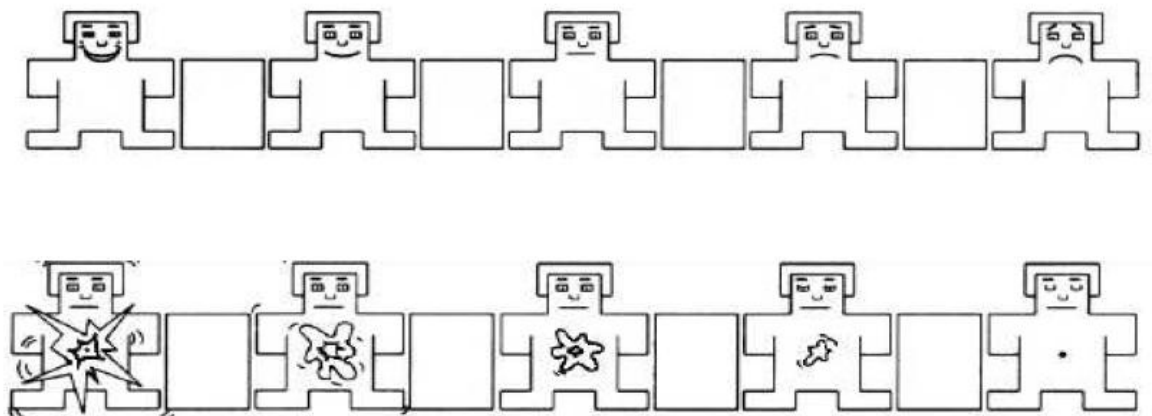
This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now. Use the following scale to record your answers:

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

____ cheerful	____ afraid	____ joyful	____ at ease
____ relaxed	____ shaky	____ nervous	____ scared
____ delighted	____ happy	____ lonely	____ enthusiastic
____ sad	____ alone	____ excited	____ downhearted
____ calm	____ blue	____ jittery	____ energetic
____ lively	____ frightened		

Self-Assessment Manikin (SAM; see Ch. 2.6.9)

Please indicate, by placing a cross within or between the appropriate figure, how you feel right now:



Intrusions Questionnaire (see Ch. 2.6.10)

Please think back to the two minute break after the video, and circle the appropriate answer.

How much of the time were you dwelling on the events in the video footage (or on related topics)?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
None of the time Half of the time All of the time

How distressing did you find these thoughts?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
Not at all distressing Moderately distressing Extremely distressing

During those two minutes, how many times did images from the video come into your mind?

_____ time(s)

How much did the images seem to be happening now, rather than being something from the past?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
Not at all Moderately Very much

How distressing did you find these images?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
Not at all distressing Moderately distressing Extremely distressing

Daily Diary – Excerpt: Day 1 only (see Ch. 2.6.11)

DAY 1 **DATE** _____

PLEASE FILL IN THIS SECTION SHORTLY AFTER YOU WAKE UP

Did you have any distressing dreams? Yes/ No

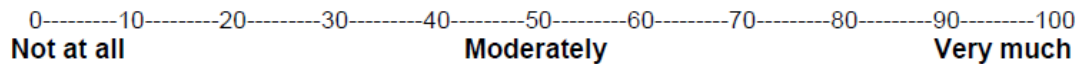
Did they relate to accidents/ the video in any way? Yes/ No

PLEASE FILL IN THIS SECTION IMMEDIATELY AFTER LISTENING TO THE RECORDING

Time of day listened to the recording _____

Please write down today's codeword _____

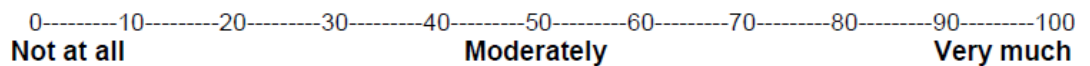
How able were you to concentrate on the task and successfully follow the instructions?



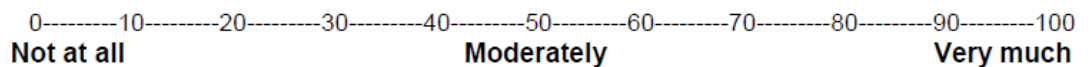
How many times did images from the video come into mind while listening to the recording?

_____ times

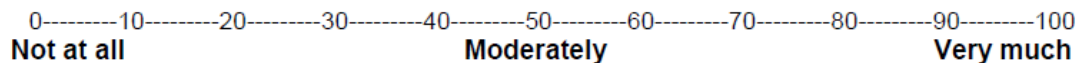
How distressing did you find these images?



To what extent did the images seem to be happening now instead of being something from the past?



How easy did you find it to return to normal life after listening to the recording today?



PLEASE FILL IN THIS SECTION AROUND THE MIDDLE OF THE DAY

How many times did images from the video spontaneously come into your mind during the first half of the day? Please do not include the time you spent listening to the sound recordings.

_____ times

How distressing did you find these images?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
Not at all **Moderately** **Very much**

To what extent did the images seem to be happening now instead of being something from the past?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
Not at all **Moderately** **Very much**

Please estimate for how many minutes in total you found yourself thinking about accidents and/or the video during the first half of the day. Please do not include the time you spent listening to the sound recordings.

_____ minutes

How distressing did you find these thoughts?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
Not at all **Moderately** **Very much**

PLEASE FILL IN THIS SECTION BEFORE YOU GO TO BED

How many times did images from the video spontaneously come into your mind during the second half of the day? Please do not include the time you spent listening to the sound recordings.

_____ times

How distressing did you find these images?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
Not at all **Moderately** **Very much**

To what extent did the images seem to be happening now instead of being something from the past?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
Not at all Moderately Very much

Please estimate for how many minutes you found yourself thinking about accidents and/or the video during the afternoon and evening. Please do not include the time you spent listening to the sound recordings.

_____ minutes

How distressing did you find these thoughts?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
Not at all Moderately Very much

How nervous did you feel in traffic [if a road user] / when crossing roads [if a pedestrian] today?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100
Not at all Moderately Very much

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way today.

Use the following scale to record your answers:

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

____ cheerful	____ afraid	____ joyful	____ at ease
____ relaxed	____ shaky	____ nervous	____ scared
____ delighted	____ happy	____ lonely	____ enthusiastic
____ sad	____ alone	____ excited	____ downhearted
____ calm	____ blue	____ jittery	____ energetic
____ lively	____ frightened		

Concerns about Accidents Questionnaire (CAQ; see Ch. 2.6.12)

Below is a list of concerns that people may have after watching the accident scenes. How much does each concern apply to you after having watched the video? Please circle the appropriate answer.

		Does not apply at all		Does not really apply		Neither nor			Applies a little		Applies very much	
1.	Why is road traffic so dangerous?	-5	-4	-3	-2	-1	0	1	2	3	4	5
2.	Could one ever rely on other road users again after experiencing such an accident?	-5	-4	-3	-2	-1	0	1	2	3	4	5
3.	I could die at any moment.	-5	-4	-3	-2	-1	0	1	2	3	4	5
4.	What if an accident like that happened to my loved ones?	-5	-4	-3	-2	-1	0	1	2	3	4	5
5.	Why have I never realised that I could die at any moment?	-5	-4	-3	-2	-1	0	1	2	3	4	5
6.	It must be awful to have your life suddenly changed for the worse.	-5	-4	-3	-2	-1	0	1	2	3	4	5
7.	Why do people have to drive that recklessly?	-5	-4	-3	-2	-1	0	1	2	3	4	5
8.	How much pain must the injured people have experienced!	-5	-4	-3	-2	-1	0	1	2	3	4	5
9.	Could they not have rescued the victims more quickly?	-5	-4	-3	-2	-1	0	1	2	3	4	5
10.	Will the people who were injured ever completely recover?	-5	-4	-3	-2	-1	0	1	2	3	4	5
11.	Would I ever be able to cope with such an experience?	-5	-4	-3	-2	-1	0	1	2	3	4	5
12.	Could I ever stop feeling guilty after causing an accident?	-5	-4	-3	-2	-1	0	1	2	3	4	5
13.	Why can't I get the moans of those injured people out of my mind?	-5	-4	-3	-2	-1	0	1	2	3	4	5
14.	How could one possibly become a paramedic, facing disgusting scenes every day?	-5	-4	-3	-2	-1	0	1	2	3	4	5

Example Manipulation Checks (see Ch. 2.6.13)

Please think back to when you were watching the video footage, and circle the appropriate answer.

How able were you to focus your attention on the video footage?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100		
Not at all able	Moderately able	Completely able

How unpleasant did you find the video footage?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100		
Not at all unpleasant	Moderately unpleasant	Extremely unpleasant

Please think back to the ten-minute thinking exercise that you just completed.

How much of the time were you dwelling on the events in the video footage (or on related topics)?

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100		
None of the time	Half of the time	All of the time

Please rate how true the following statements are:

"I have been able to carry out the daily tasks throughout the week."

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100		
Never	Sometimes	Always

"I have been unable (or have forgotten) to record my memories of the accident scenes in the diary."

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100		
Never	Sometimes	Always

"I have taken care over filling in the daily questionnaires."

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100		
Never	Sometimes	Always

"I have recorded my memories on a different day than I was supposed to."

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100		
Never	Sometimes	Always

"When I was doing the thinking tasks, I was dwelling on events from the video (or related topics)."

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100		
Never	Sometimes	Always

"The questions that I was asked to dwell on during the week felt relevant to me personally."

0-----10-----20-----30-----40-----50-----60-----70-----80-----90-----100		
Never	Sometimes	Always

Service Evaluation Project

An investigation into referrals for cognitive assessment within a Child and Adolescent Mental Health Service (CAMHS) in South-East London

Supervised by: Dr Laura Lunt

ABSTRACT

The literature indicates a substantial evidence-base for the association between childhood cognitive difficulties and psychiatric presentations: despite this, it has been suggested that a neurodevelopmental perspective is not routinely considered within mainstream Child and Adolescent Mental Health (CAMHS) services (Humphreys, 2006). Consultation with a CAMHS service in South-East London indicated concerns from psychologists that current practice with regard to neuropsychological assessment remained unknown and unmonitored, despite the weight of evidence supporting the role of cognitive factors within emotional and behavioural presentations.

As such, this study was conceptualised in two parts: firstly, a retrospective case-note review sought to examine the characteristics of referrals accepted for cognitive assessment over a one-year period; secondly, the understanding and perceived utility of neuropsychological assessment by the wider multidisciplinary team was explored via a series of interviews with care co-ordinators. Results describe the quantitative aspects of referral characteristics (including the number of assessments conducted; key demographics; primary reason for referral; and choice of cognitive assessment), in addition to qualitative analysis of the key themes emerging from care co-ordinator interviews. A wide range of understanding and a diversity of perspectives on the utility of cognitive assessment are illustrated, examined and summarised. Finally, implications for the service are discussed, including potential barriers to referral, and recommendations for future consideration are outlined.

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1. INTRODUCTION

1.1 Overview

The relationship between developmental learning difficulties and childhood behavioural and/or psychiatric disorders has long been recognised in the literature. Although it is now well established that children with global developmental intellectual disability are at greater risk of childhood mental health difficulties (Rutter et al., 1970; Emerson, 2003), increased attention has been given to the fact that specific cognitive difficulties can also be associated with behavioural and emotional disorders. It has been estimated that approximately 45% of children and adolescents attending mental health services have a specific reading or communication disorder, compared to just 5% of children in the population as a whole (Cohen et al., 1998). Prevalence rates for learning difficulties within these clinical contexts indicate a clear role for cognitive assessment, and it seems evident that identifying any developmental delay, including specific learning difficulties, constitutes an essential component of formulating how best to meet a child's needs as part of service delivery.

1.2 Specific Learning Difficulties and Childhood Psychiatric Disorders

Within the literature examining this association, particular attention has been paid to the domains of specific reading disability (cf. Rutter, Tizard & Whitmore, 1970; Frisk, 1999; Willcutt & Pennington, 2000); language impairment (cf. Cohen et al., 1993, 1998); and deficits in executive functioning (Crawford, Kaplan & Dewey, 2006). The evidence for cognitive and psychiatric co-morbidity within each of these areas is therefore considered below, highlighting the importance of cognitive assessment within child mental health services.

1.2.1 Reading disability

Willcutt & Pennington (2000) describe reading disability as a developmental disorder 'characterised by specific impairments in single word reading, reading fluency and reading comprehension'. It has been estimated to occur in 3-10% of children within community samples (Wadsworth et al., 1992); with children with specific reading disability demonstrating more frequent emotional and behavioural difficulties compared to controls (Beitchman & Young, 1997). Prevalence is notably increased when externalising behaviours

(including aggression, oppositional or conduct disordered behaviour) are considered within clinical samples (Rutter et al., 1970; Frith et al., 1991). Reading disability has often been used as a representation of specific learning problems within the literature, due largely to the value placed on reading ability within society, and as it underpins and is fundamental to teaching within schools (Hinshaw, 1992).

Much of the research noting the association between specific learning and behavioural difficulties has posited theories on direction of causality. Hinshaw's (1992) review outlines differing perspectives: specific learning disability as a causal factor in behavioural difficulties, for example, perhaps due to the child's frustration, demoralisation, and decreased self-esteem at perceived academic failure (termed the 'failure hypothesis' by Grande, 1988); or vice versa, with behavioural problems seen as contributing to specific learning difficulties and subsequent underachievement. Prospective studies have indicated evidence in favour of a third variable, such as inattention or hyperactivity, mediating this relationship.

The Dunedin study, for example, found hyperactivity to negatively correlate with verbal and performance IQ and reading level, when other dimensions including externalising behaviours were controlled for (McGee et al., 2006). Further evidence for this association comes from Willcutt & Pennington (2000), who found that although increased rates of externalising behaviours did exist within a reading disability group when compared to a group without the disability, this relationship disappeared when the authors controlled for ADHD (of which inattention and hyperactivity are diagnostic features). The co-occurrence of ADHD and reading disability has been well established in the literature, with overlap between the disorders estimated to range from 35 – 50% (Dykman & Ackermann, 1991; Hinshaw, 1992), suggesting that characteristic features of ADHD may play a mediating role in the relationship between specific learning problems (such as reading) and presenting behavioural difficulties.

Reading disability has also been shown to be associated with increased rates of internalising disorders, such as anxiety and depression (Willcutt & Pennington, 2000). Interestingly, unlike with the externalising behaviours, this association did not disappear when the authors controlled for ADHD, indicating differing underlying mechanisms for impact on broader psychiatric presentation. Instead, a significant relationship was found between reading disorder and somatic complaints: for example, it was suggested that some children may develop physical symptoms in response to the stress of academic work. Clinically therefore, the importance of specific reading disability identification is key in formulating the genesis

and maintenance of a child's emotional difficulties, whether these present within an internalising or externalising framework.

1.2.2 Language Impairment

Language impairments have been commonly observed among children referred for psychiatric services (Cohen et al. 1993; 2000), as well as within epidemiological samples (Beitchman et al., 1986) and community speech and language clinics (Cantwell & Baker, 1991). Cohen et al. (2000) found that 63% of 7 – 14 year old outpatients within psychiatric services reach criteria for language impairment. Furthermore, it has been highlighted that many children's language difficulties may remain hidden until routine screening takes place. Cohen et al. (1993) considered those children referred solely for behavioural or emotional problems, and found there to be previously unsuspected language impairment in 33% of the 4-12 year olds referred. The authors suggested that the lack of detection might in part be due to less severe (and therefore less apparent) problems with expression than in those children for whom difficulties are identified.

Additionally, Cohen et al. (1998) found that children in whom language impairment had previously been identified were also those likely to demonstrate lower levels of academic attainment, with relatively milder difficulties observed in the 'unsuspected' group. This is perhaps an indication that milder difficulties in achievement masked language difficulties within this group. This is likely to be highly relevant within a CAMHS context, as if undetected, even mild difficulties with respect to receptive or expressive communication may be misinterpreted, for example as deliberate inattention or misbehaviour (Cohen et al., 1998). Identifying impairment therefore allows for difficulties to be more accurately understood, and addressed in context. Distinguishing between specific impairments in a child's presentation may have important implications for appropriate treatment strategies, such as adapting communication style dependent on receptive vs. expressive difficulties. This might also serve an important role in aiding more helpful parental attributions, by allowing the parent to recognise a biological basis for their child's difficulties and to disentangle receptive communication impairment and deliberate ignoring.

In addition, language impairment has long since been associated with a myriad of cognitive deficits (Johnston, 1988). Evidence from speech and language clinics indicates that children with language impairment also commonly exhibit difficulties in reading, spelling, and mathematics, as well as in visual-motor integration skills (Cohen et al., 1998; Beitchman et al., 1996). Furthermore, language impairment has been associated with reading disability, for

example, via the associated core deficits in phonological processing (processing speech sounds) (Wagner & Torgesen, 1987) and executive functioning difficulties (Cohen et al., 1998). Finally, it has been argued that verbal mediation may play a key role in a child's behavioural self-regulation (Hinshaw, 1992). Consequently the child with expressive/receptive difficulties is at greater risk of experiencing frustration at negative interactions with parents, teachers and peers, potentially leading to compounded behavioural difficulties and impacted learning experiences.

1.2.3 Executive Dysfunction

Executive functioning refers to a set of abilities including planning, inhibition, set shifting and working memory (Sergeant, Geurts & Oosterlaan, 2002). It has been argued that working memory may be a central contributing factor underlying many specific learning difficulties: spatial working memory has been found to be associated with arithmetic disability, for example, while both verbal and spatial working memory are linked to reading disability (Gathercole & Baddeley, 1993). Working memory has also been shown to be involved in the regulation of affect and behaviour (Barkley, 1996), and it has been posited that this may be an explanatory mechanism with regards to the strikingly high co-morbidity of learning difficulties and psychiatric presentations (Cohen et al., 1998).

Attention Deficit Hyperactivity Disorder (ADHD), in which children consistently show cognitive deficits in executive functioning, has been described as one of the most common disorders of childhood (Crawford, Kaplan & Dewey, 2006). As outlined above, ADHD is the most frequent psychiatric diagnosis observed in both reading disability (Hinshaw, 1992) and language impairment (Cohen et al., 2000); and is also commonly seen within specific arithmetic disability samples (Humphrey, 2006). Furthermore, Hinshaw (1992) notes that hyperactivity and inattention have the most significant association with academic underachievement. For these reasons, it is evident that cognitive assessment represents an essential tool within CAMHS services, allowing for the identification of underlying associated deficits as described (alongside providing an opportunity for gathering information from behavioural observations), in order to aid all parties' understanding of the presenting behavioural difficulties; to support diagnostic process; and to inform appropriate treatment strategies for managing the disorder.

1.3 Clinical implications for CAMHS

Consideration of the above domains highlights the extensive co-existence of emotional, behavioural and cognitive/ learning difficulties. Consequently, some authors have argued that identifying and distinguishing between different co-morbidities serves only to make irrelevant distinctions that lack validity. Gilger & Kaplan (2001) note that co-morbidity is 'the rule rather than the exception', proposing an alternative conceptual framework to reflect these commonalities, termed 'atypical brain development'. Yet regardless of the way in which this overlap is conceptualised, it is evident that the need for early detection of cognitive impairment across a range of domains (language, reading, or working memory for example) is indicated.

Evidence suggests that a combination of: i) strategies pertaining directly to learning difficulties, and ii) psychotherapy / parental work as traditionally offered within CAMHS, is likely to produce significantly better outcomes than either approach in isolation (Hechtman et al., 1996). Assessment of cognitive strengths and weaknesses might allow for therapy - a predominantly verbal modality - to be appropriately modified; for example, less reliance on linguistic material and increased use of visual aids where necessary. If, for instance, working memory is impaired, the clinician may consider conducting shorter sessions, or incorporating several - relatively briefer - tasks within each. As such, the intervention becomes increasingly idiosyncratic and appropriate. In turn, this would allow for frustration around miscommunication or poor performance to be alleviated, and a 'successful' intervention experience to be provided: perhaps counteracting previous experiences of failure, and redressing low self-esteem. Cognitive assessment clearly has a critical role to play within CAMHS.

Despite this, it has been argued that the neuropsychological perspective is not routinely considered within child services, and it has been noted that many children are discovered to have unidentified learning difficulties only some time *after* the point of their referral to CAMHS (Humphrey, 2006). The potential downfalls associated with such an approach were outlined by Humphrey (2006) through consideration of the case study of 'Jay', a young boy seen within CAMHS to address behavioural difficulties at school and home. Jay and his family had been offered psychotherapy and behavioural management intermittently for two years before a full neuropsychological assessment was eventually suggested, and a diagnosis of dyslexia made. The subsequent intervention was able to integrate strategies in helping Jay better manage his dyslexia, alongside psychotherapy to address the associated emotional impact (such as low self-esteem and frustration around specific cognitive tasks). This holistic

approach to treatment allowed for the underlying cause of Jay's behaviour to be formulated and addressed appropriately, and provided parents, teachers and clinicians alike with a fuller biopsychosocial understanding of his difficulties.

To further investigate this issue of under-detection within CAMHS, Humphrey (2006) outlines the internal audit undertaken within her own CAMHS Tier 3 outpatient service in Cambridge, in which Jay was seen. Consideration of neuropsychological assessment referrals, and clinicians' views, revealed a number of potential barriers to referral and therefore to effective service provision. In particular, it was noted that some referring clinicians viewed the assessment of learning difficulties as being the domain of educational psychologists rather than CAMHS' psychologists. Similarly, beliefs were identified among referring clinicians that learning difficulties were not associated with emotional and/or behavioural difficulties - or if they were, that they could be treated separately. Many referrers thought that clinical psychologists did not see cognitive assessment as an integral part of their clinical work, impacted in part by historical controversies around the validity of 'generating IQ scores in a vacuum' (Humphrey, 2006). As a result of these findings, the Cambridge service was able to address some of these issues: psychologists were encouraged to take on greater responsibility for suggesting cognitive assessment within multi-disciplinary team meetings; and a referral form was introduced, which encouraged clinicians to consider how they might use the results of a cognitive assessment in the context of their ongoing therapeutic work with the child. As such, it was hoped to foster a sense of interrelatedness regarding cognitive assessment and the therapeutic process.

The following service project was similarly conceptualised as an initial investigation into referral patterns within a Tier 3 CAMHS service in South-East London, particularly with respect to potential biases in/ barriers to referral. It was intended that consideration of these issues would facilitate the delivery of increasingly effective service provision in the future.

1.4 Background to Service

This project took place within a local Tier 3 CAMHS service in South East London. The CAMHS service comprised two generic multidisciplinary mental health teams covering the East and West of the borough, and one specialist neurodevelopmental (NDT) team, which aimed to meet the needs of children with specific neurodevelopmental disorders. Each team included one clinical psychologist, plus any trainee clinical psychologists they were currently supervising on placement. In addition, specific clinics were run for the assessment,

diagnosis and preliminary management of ADHD and Social Communication Disorders (Autism Spectrum Disorders). Clinics were run independently to, and alongside, the work of the three CAMHS teams with distinct referral pathways; however psychology input was provided to each clinic by the three team psychologists.

It was reported that there was not a system currently in place for recording or monitoring requests to psychologists for neuropsychological assessment across any of the three teams or clinics. As such, psychologists within the service were unclear of the number of assessments being undertaken within any defined period; whether or not these were generally appropriate referrals; and therefore whether the resources of psychology were being utilised optimally. Additionally, the efficacy of assessments in identifying previously unsuspected difficulties was unclear, and the perceived utility of this from the perspective of care co-ordinators unknown. The rationale for examining current practice was understood as helping to contribute to the development of clearer guidelines for referral (thereby formalising the referral pathway), as well as to provide a baseline for future audit.

1.5 Project Aims

Given the, this project was conceptualised with several overall aims. In particular, it was considered important to investigate the type of referrals currently being accepted by psychologists across different teams, given the lack of existing criteria. It was hoped that this information would contribute to the development of clear referral criteria, or guidelines, for the teams, thus enabling greater consistency and equity of access for cognitive assessment across the service. To achieve this, the project was designed in two parts:

Part 1:- A case note review of accepted referrals for neuropsychology assessment within a one-year period

As the following factors were unknown within the identified teams, the first part of the project aimed to:

- a) Establish the number of neuropsychological assessments carried out
- b) Examine the characteristics of these referrals
- c) Provide a base-line for future audit

Part 2:- Interviews with care co-ordinators

It was also thought that consideration of the wider team perspective (outside of clinical psychology) would be helpful in determining current attitudes towards neuropsychological assessment, as demonstrated by Humphrey (2006). Therefore, the second part of the project aimed to:

- a) Investigate the current understanding within teams regarding the purpose of cognitive assessment and how this fitted in with their work
- b) Consider any perceived barriers to cognitive assessment
- c) Consider care co-ordinators' ideas for service improvement and to promote further discussion of this issue within the teams

2. PART ONE: A CASE NOTE REVIEW

2.1 Methodology

2.1.1 Design

The first part of this study was a retrospective review of the accepted referrals for neuropsychological assessment within selected CAMHS teams in the service (East, West and NDT). A within-subject design was used to establish the number of assessments that had been conducted in total within a predefined one-year period (January 2009 - January 2010), as well as the characteristics of these referrals.

2.1.2 Participants

Clinical psychologists based within the identified teams were asked to provide their reports for all neuropsychological assessments carried out within the specified period, including those conducted by any trainees under their supervision. Therefore the identified sample consisted of any child who had undergone a cognitive assessment within this period.

2.1.3 Materials

The assessment reports of the team psychologists were used to gather data regarding referral characteristics. Where relevant data was missing from reports (and was deemed necessary) this was obtained by consulting clients' electronic records (ePJS).

2.1.4 Procedure

Approval for this study was granted by the Audit committee (Appendix A). All psychologists provided copies of reports for the cognitive assessments they had carried out between January 2009 and January 2010. Assessments undertaken as part of specified clinics, for example the ADHD Clinic and Communication Disorders Clinic, were excluded from the case-note review as these proceeded via a separate referral route. However, an overall count of the number of cognitive assessments conducted in these was obtained.

In particular, the retrospective case-note review considered the total number of referrals accepted for assessment, and the characteristics of these referrals including: demographic

variables; reason for referral; neuropsychological tests administered; and outcome of referral. All referrals came from the child's care co-ordinator.

2.2 Results

2.2.1 Clinics vs. Teams

Figure 1 illustrates the proportion of total cognitive assessments conducted within the defined one-year period by selected teams within the service. Altogether, 64 assessments were carried out over the year (January 2009- January 2010) by the three CAMHS teams and two identified developmental clinics. Unsurprisingly, the combined team assessments comprised the majority of these requests for assessment (54%); followed by the ADHD clinic (41%); and the Communications clinic (5%).

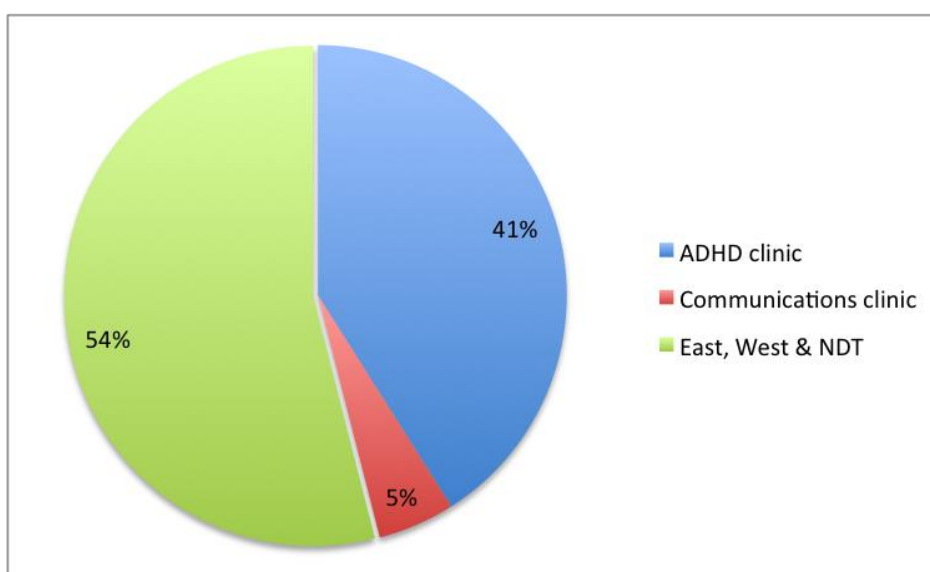


Figure 1: Total number of cognitive assessments conducted (Jan 09-Jan 10)

Within this, the number of assessments carried out by each of the three CAMHS teams outside of clinic was examined (Figure 2). It was these team assessments that formed the basis of the case-note review.

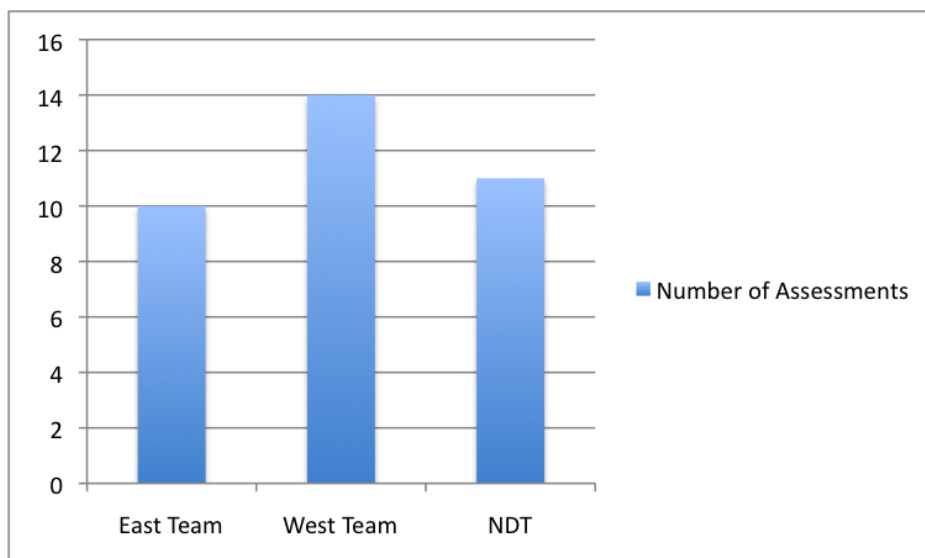


Figure 2: Number of assessments per team

2.2.2 Key demographics of accepted team referrals

(a) Age

The mean age of children at time of assessment was 9 years old. However, it was clear that there was a broad age-range for referrals, spanning from 4years 6 months to 15 years 11 months, and with a mode of 14yrs.

(b) Ethnicity

Figure 3 below provides a breakdown of ethnicity with regards to referrals accepted for neuropsychological assessment. Ethnicity was defined using the classification selected by parents at the time of their child's initial presentation in CAMHS, and was extracted from ePJS records.

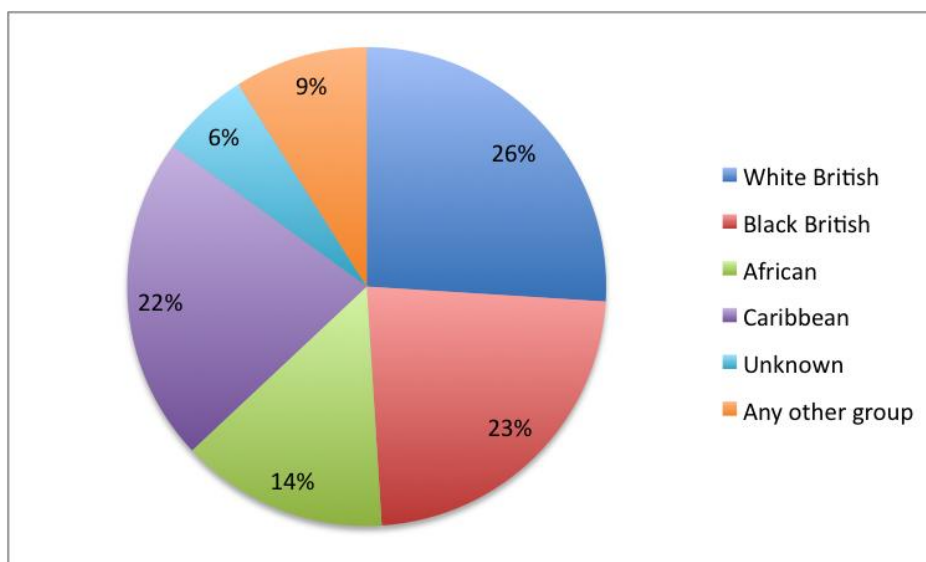


Figure 3: Ethnicity data stored on EPJS for all accepted referrals

From the data above, it appeared that children from White British and Black British ethnic groups were most likely to have received a neuropsychological assessment. A comparison of our data with ethnicity data from the local borough was undertaken, to evaluate whether this accurately represented the ethnicity of children within the borough as a whole. Whilst White British was found to be the dominant ethnic group within the borough (67%), the majority of assessments were carried out with children from Black and Minority Ethnic (BME) backgrounds (59% vs. 23% borough population).

Ethnicity	%
White	67
Black British/ Caribbean/ African	23
Asian	4

Figure 4: Census data (2001) for local borough (adult and child)

2.2.3 Primary reason for referral

The principal reason for referral was extracted from each neuropsychological report, and collapsed into wider categories for ease of representation (Figure 5). This data suggests that cognitive assessment was often used diagnostically, on occasions where care co-ordinators suspected a global learning disability (23%) or ADHD (31%) to be present, but also within a broader context; for example, the care co-ordinator seeking to obtain a wider perspective on

the child's difficulties (20%). Reason for referral is explored more comprehensively in Part 2 of this study.

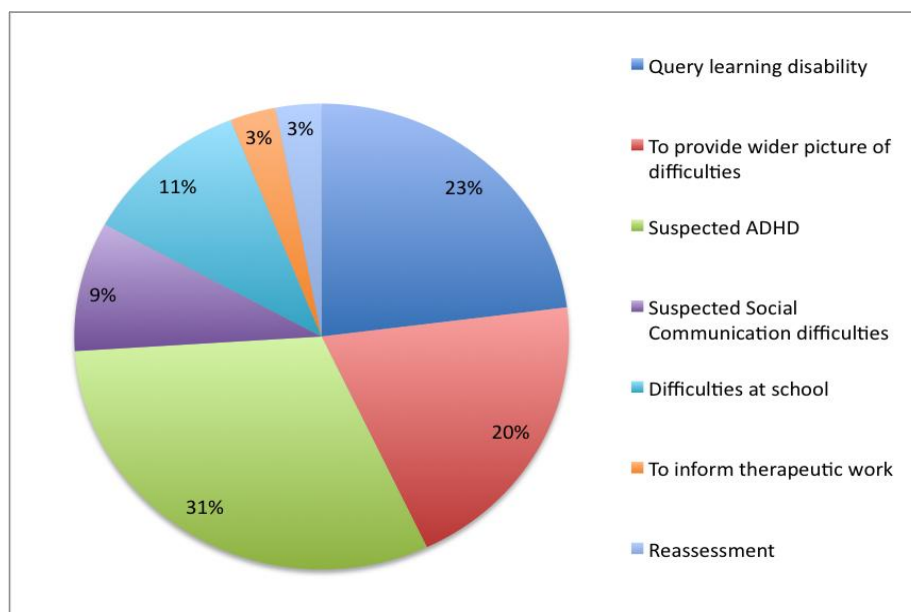


Figure 5: Primary reason for referral

2.2.4 Neuropsychological tests administered

The neuropsychological test batteries selected for administration were also examined (Figure 6).

The WISC-IV and WPPSI-II were most commonly administered as stand-alone assessments, accounting for 60% of the total conducted. Examination of the remainder indicated that the WISC-IV/ WPPSI-II were used in conjunction with more specific tests, as deemed appropriate by the clinician. The most common combination was the WISC-IV and the NEPSY-II (for assessment of social communication difficulties). Those tests less frequently administered included tests of attainment; for example the WIAT-II (on 4 occasions; 12%) and BPVS-II (on one occasion; 3%).

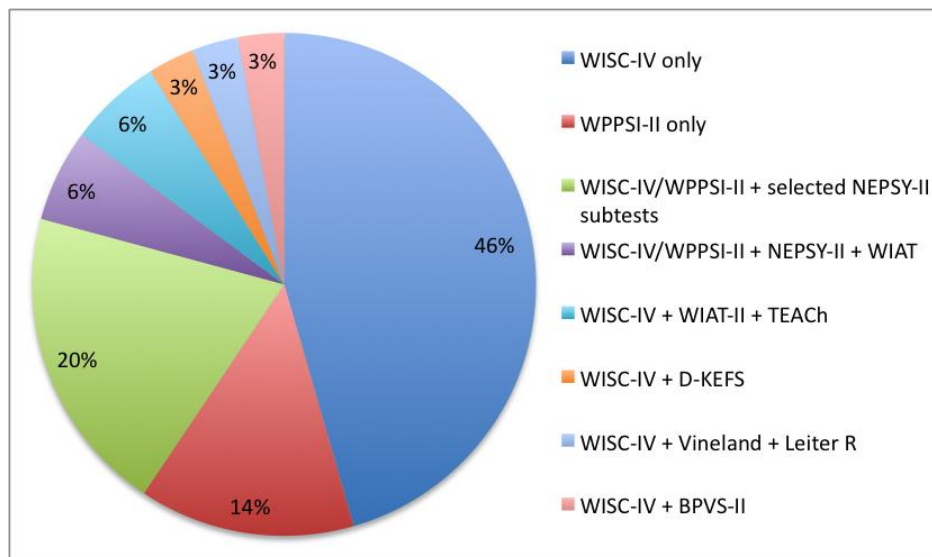


Figure 6: Neuropsychological tests administered

2.2.5 Outcomes: Generalized learning disability

It was previously noted that one of the more common reasons for referral was a query around the presence of global learning disability. Alongside the reported Full Scale IQ (FSIQ) or General Ability Index (GAI), the psychologists' conclusions within the report were considered in examining the proportion of cases where a generalised learning disability was indicated (Figure 7).

FSIQ/ GAI	Frequency	Proportion of total
FSIQ indicates no generalised learning disability	24	69%
FSIQ indicates 'mild learning disability' range	5	14%
FSIQ indicates 'moderate learning disability' range	1	3%
FSIQ indicates learning disability unspecified	1	3%
Scores too discrepant to calculate FSIQ/GAI	4	11%

Figure 7: Proportion of cases where generalized learning disability indicated

Therefore, on the basis of FSIQ or GAI alone, the majority of assessments undertaken did not suggest evidence of a generalised learning disability. Of assessments in which a possible global learning disability was indicated (21%), the 'mild learning disability' range was more frequently observed than either 'moderate' or 'severe'.

2.2.6 Outcomes: Further neuropsychological assessment recommended

Further neuropsychological assessment was recommended for more than half (57%) of children tested, with disorder-specific investigation often the primary rationale for follow-up. Further consideration regarding the presence of specific learning needs was requested in only 11% of cases. These findings are illustrated in Figure 8 (below).

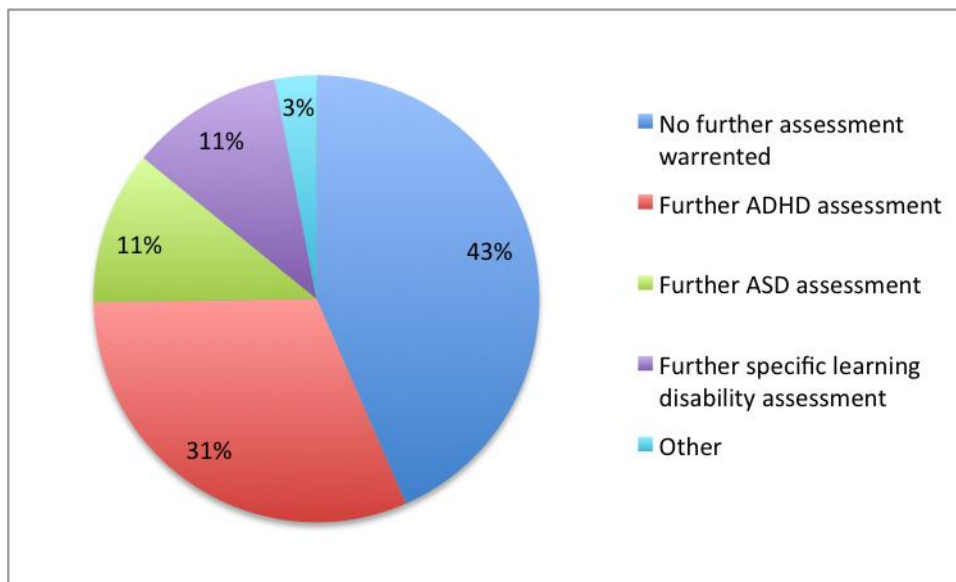


Figure 8: Proportion of cases where further assessment recommended

2.3 Discussion

A case-note review of the team referrals accepted for neuropsychological assessment highlighted several characteristics of the current referral pattern. An initial count of the number of assessments carried out by clinical psychologists in the service indicated that the majority of these assessments took place in the context of the specific teams (54%), as would reasonably be expected. However, given that psychology input to clinics such as the ADHD and Social Communications Disorders clinic comprised a much smaller proportion of psychologists' clinical work (one session per week), it was perhaps surprising that in reality, assessments undertaken within these clinics accounted for such a large proportion of the total. Additionally of note, due to ongoing maternity leave across the service, the total number of assessments conducted in this period - and reported here - is likely to be an underrepresentation of previous capacity.

Consideration of key demographic features indicated that children undergoing assessment were of a wide range of ages (spanning from 4 to 15 years old) and ethnicities. The most common age at which a cognitive assessment was conducted was 14 years old; perhaps reflecting a time when difficulties with learning become increasingly apparent, within the context of the mid- secondary school years (for example, with the prospect of GCSE examinations). This relatively late detection is evidently problematic with regards to an early intervention model of working, and may reflect increasingly hard to manage behavioural difficulties in the classroom at this time. Equally, the wide range of ages at which assessments were undertaken may also simply reflect underlying diversity in reason for referral at different developmental stages. Consideration of ethnicity within this sample (in conjunction with the local census data) demonstrates that the children offered neuropsychological assessment were predominantly from BME backgrounds. While this would seemingly indicate the accessibility of neuropsychological services for diverse groups within the local population, it remains unclear whether this relative over-representation is attributable to greater BME presence in the CAMHS service as a whole, or alternatively is specific to referral for cognitive assessment.

Reason for referral was also considered. The three primary reasons for referral identified were: suspected learning disability, suspected ADHD, and the care co-ordinator wanting to obtain a wider picture of the child's difficulties. Suspected diagnosis on the part of the care co-ordinator appeared to constitute a primary reason for neuropsychological assessment requests (for example, queried generalised learning disability or ADHD). Given the literature and noted association with specific learning/ cognitive difficulties, it is perhaps unsurprising that ADHD symptomatology was frequently cited as a dominant reason for referral. However, it is interesting that suspected ADHD was identified as the most common reason for assessment requests within teams (in 31% cases), despite the existence of a specific ADHD clinic. This may simply reflect the high frequency with which inattention/ hyperactivity correlates with behavioural and emotional problems. On discussion with the team, it was felt this may also reflect in part the long waiting times that existed for being seen within the ADHD clinic, with many care co-ordinators opting to obtain a neuropsychological assessment in the context of team working rather than making a separate referral and having a substantial delay. It would have been useful to make a comparison between the average number of weeks waited for assessment as part of the ADHD clinic vs. outside of clinic, however this data was not available due to the lack of a recording system for requests for assessment. This may be an interesting and useful factor for future exploration. Overall, consideration of the number of assessments conducted for which

ADHD was the primary referring reason, highlights the importance of neuropsychological assessment in aiding this diagnosis.

In the majority of cases, a generalised learning disability was not indicated (69%). The presence of a generalised learning disability was considered on the basis of overall FSIQ or GAI scores and the psychologist's conclusions within the report. Where a learning disability *was* indicated, the majority of children fell within the 'mild learning disability' range; this is suggestive that neuropsychological assessment is more commonly undertaken with children for whom the presenting impairment is unclear. As well described in the literature, presenting difficulties may have taken an alternative form, manifesting as behavioural difficulties at home or within school. This may reflect the other common reason for referral, that is, care co-ordinators appreciating the need for a broader perspective on the child's difficulties (and perhaps feeling unsure of how to proceed). None of the children assessed within this sample fell into the 'severe learning disability' range. This is perhaps unsurprising given the availability of specialist LD CAMHS teams in the area, as well as the specificity of tests administered (floor effects on the WISC-IV, for example, rendering them redundant within certain populations). In the case of the NDT team – where children are referred if such difficulties are clearly evident – the lack of assessments in this bracket may be a reflection of clinicians' judgment that neuropsychological assessment would prove unhelpful, unreliable or inappropriate in this population: either the care co-ordinator's, on making the referral; or the psychologist's, on acceptance of the referral. Unfortunately however, we are not able to draw any firm conclusions on the basis of this data set.

Within this sample, the WISC-IV and WPSSI-II were most commonly used in isolation, and less frequently in conjunction with more specific neuropsychological tests (e.g. tests of reading or mathematics ability, such as the WIAT-II; language assessment, such as the BPVS-III; or executive functioning, such as the D-KEFS). This perhaps illustrates that a broad estimate of the child's cognitive functioning was the outcome most often sought by psychologists. Whilst a good starting point, this may be an area for further monitoring in the future: indications from the literature suggest specific learning difficulties to be strongly associated with behavioural and emotional presenting difficulties; yet within current modes of assessment these would be unlikely to be consistently detected. The perceived division of the roles of educational vs. clinical psychologists may be an influencing factor in the approach to cognitive assessment taken by CAMHS clinical psychologists; that is, a view that assessment of specific learning needs was the domain of education. Alternatively, test selection may equally be reflective of time constraints placed on the administering clinician, meaning that where additional (and increasingly specific) assessment is not explicitly

indicated – or highlighted as a principle reason for referral – it is unlikely to be undertaken. The high proportion of assessments recommending further assessment in some capacity (57%) supports the hypothesis that cognitive testing was often viewed as an initial starting point, with further assessment of specific learning needs recommended in 11% of cases.

A key limitation within this investigation was our consideration only of those referrals *accepted* for neuropsychological assessment, due to the absence of an established system in monitoring all incoming referrals. As such, factors such as the proportion of referrals declined - and reason for decline - within this period remain unknown. It is important to consider, therefore, that the referral characteristics identified in this sample may also reflect clinician bias in the acceptance of these referrals. Nonetheless, this case-note review was conceptualised as representing an important initial step towards identifying the nature of current practice within teams, in order to promote consistency where necessary, and therefore greater equity of access in the future.

In order to obtain a more comprehensive understanding of issues relating to referral and the perception of neuropsychology within referring disciplines, interviews were conducted with care co-ordinators across the teams. In particular, the aim was to investigate care co-ordinators' understanding of neuropsychological assessment, and their perception of how this could be integrated with their work; their past experience of referral; as well as any perceived barriers to accessing the service or suggestions for improvement.

3. PART TWO: INTERVIEWS

3.1 Methodology

3.1.1 Design

The second part of this study involved a qualitative investigation of referring clinicians' views of cognitive assessment. A semi-structured interview was conducted with those care co-ordinators who volunteered to take part (Appendix B).

3.1.2 Participants

Care co-ordinators within the identified teams were approached and provided with information about the study. They were also given the opportunity to ask any questions they had regarding participation. Background information and details of the investigation were presented in multi-disciplinary team meetings in order to promote interest, and in total, 15 care co-ordinators from a range of clinical backgrounds (including psychiatry, psychotherapy, social work and nursing) were interviewed.

3.1.3 Materials

A semi-structured interview was designed for the study, incorporating questions relating to the findings of Humphrey's (2006) service investigation (see Appendix B). The interview sought to explore each clinician's understanding of the purpose of cognitive assessment; to examine understanding of the relationship between learning/ cognitive difficulties and emotional or behavioural difficulties; and to enable discussion around past experiences of referral in the service, as well as providing an opportunity for suggestions for improvement in the future.

3.1.4 Procedure

Individual interviews were arranged with all consenting care co-ordinators. Interviews lasted between 15 – 30 minutes, and were recorded in writing by the investigator. Interviews were not audio-recorded, the rationale here being that this decision would encourage participation and acknowledge sensitivity to issues of confidentiality within the team. On completion of all interviews, basic thematic analysis was undertaken. This followed the procedure outlined

by Braun & Clarke (2006), whereby the investigator first becomes familiar with each interview through the process of transcribing, reading and re-reading, before generating initial codes for potential themes. Once preliminary codes have been identified, all scripts are reviewed in consideration of broader emerging themes. Inter-rater agreement of final themes was considered. The supervising Clinical Psychologist also read and independently coded all anonymised interviews; a selected sample of transcripts were then chosen for comparison and in-depth theme discussion, revealing high inter-rater agreement. In cases where a different term/ label had been used to describe a theme, this discussion allowed for selection of a label that incorporated both raters' views.

3.2 Results

3.2.1 Care co-ordinator team and background

Fifteen care co-ordinators were interviewed: seven were based in East Team, seven in the West Team, with one care co-ordinator split between the West and Neurodevelopmental (NDT) teams. This was thought to be an accurate representation, the NDT being a significantly smaller team.

Figure 9 represents the range of professional backgrounds of the care co-ordinators interviewed. It can be seen that psychotherapy and therapeutic social work was the most common background experience of the interviewees.

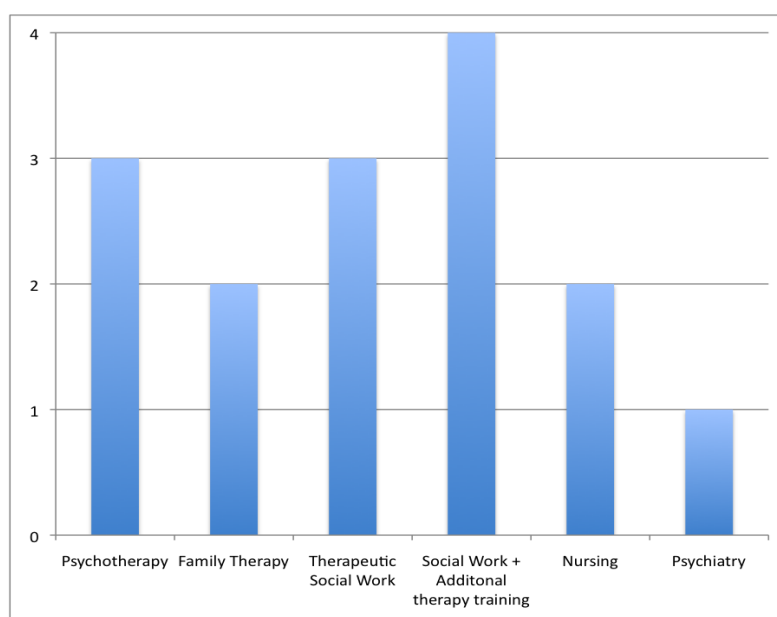


Figure 9: Background of care co-ordinators (self-identified)

3.2.2 Qualitative aspects of the interview

The interview transcript can be found in Appendix B. Care co-ordinators' responses to each question were coded using thematic analysis and the themes are represented visually in Figures 10 and 11. Figure 10 highlights themes pertaining to questions assessing care co-ordinators' understanding of cognitive assessment (including beliefs around cultural difference and its validity) and of the association between learning difficulties and emotional/ behavioural problems (including application to clinical intervention). Figure 11 highlights themes relating to care co-ordinators direct experiences of referral within the service. Although it is not possible to discuss all themes arising, key examples from each of these three domains are considered in greater detail below.

Care Co-ordinator	Team	Background	Purpose of cognitive assessment	Beliefs about impact of culture on assessment	Impact of learning difficulty on therapeutic work?	Association learning difficulty & emotional / behavioural difficulties?	Supported separately vs. part of therapeutic intervention?
1	East	Family Therapy	ABILITY/ LEARNING	COMMUNICATION	COMMUNICATION	SEPARATE (DEPENDENT ON DIAGNOSIS)	INTEGRAL AGENCIES: PARENTS
2	East	Psychotherapy	ABILITY/ LEARNING WIDER COMPLEX DIAGNOSTIC ASSESS.	RELATIONAL	COMMUNICATION ADAPTING THERAPY	FRUSTRATION	INTEGRAL ADAPTING THERAPY
3	East	Social Work	ABILITY/ LEARNING UNCERTAINTY	RELATIONAL UNCERTAINTY	COMMUNICATION ADAPTING THERAPY	FRUSTRATION	NEED FOR SPECIALIST TRAINING
4	West/ NDT	Social Work/ Family Therapy	ABILITY/LEARNING WIDER COMPLEX DIAGNOSTIC ASSESS. INFORM INTERVENTION	UNCERTAINTY	COMMUNICATION ADAPTING THERAPY	INTEGRAL FRUSTRATION SELF ESTEEM	INTEGRAL AGENCIES: SCHOOL
5	East	Social Work/ CBT	ABILITY/ LEARNING	DIFFERENT CONCEPTS/ BIAS	ADAPTING THERAPY SELF ESTEEM	FRUSTRATION SELF ESTEEM	INTEGRAL AGENCIES: SCHOOL
6	East	Nursing	WIDER COMPLEX DIAGNOSTIC ASSESS. INFORM INTERVENTION	UNCERTAINTY FEAR	ADAPTING THERAPY CARE PLANNING	EMOTIONAL IMPACT ON LEARNING	SEPARATE AGENCIES: SCHOOL
7	East	Psychotherapy	ABILITY/ LEARNING WIDER COMPLEX DIAGNOSTIC ASSESS.	DIFFERENT CONCEPTS/ BIAS	ADAPTING THERAPY EMOTIONAL IMPACT ON LEARNING	INTEGRAL AGENCIES: SCHOOL	INTEGRAL AGENCIES: SCHOOL
8	West	Family Therapy	ABILITY/ LEARNING INFORM INTERVENTION	DIFFERENT CONCEPTS/ BIAS	ADAPTING THERAPY COMMUNICATION	INTEGRAL COMMUNICATION SELF ESTEEM	INTEGRAL ADAPTING THERAPY
9	West	Psychotherapy	ABILITY/ LEARNING UNCERTAINTY	UNCERTAINTY	COMMUNICATION	FRUSTRATION COMMUNICATION	SEPARATE AGENCIES: SCHOOL
10	East	Social Work/ Family Therapy	ABILITY/ LEARNING INTEGRAL	DIFFERENT CONCEPTS/ BIAS RELATIONAL	ADAPTING THERAPY COMMUNICATION CARE PLANNING	FRUSTRATION SELF ESTEEM BULLYING	UNCERTAINTY AGENCIES: SCHOOL
11	West	Nursing	ABILITY/ LEARNING BEHAVIOURAL OBS	DIFFERENT CONCEPTS/ BIAS	ADAPTING THERAPY	RISK FACTOR FRUSTRATION	INTEGRAL ADAPTING THERAPY AGENCIES: SCHOOL
12	West	Social Work	ABILITY/ LEARNING INFORM INTERVENTION	DIFFERENT CONCEPTS/ BIAS	COMMUNICATION	INTEGRAL RISK FACTOR	INTEGRAL
13	West	Social Work/ Family Therapy	ABILITY/ LEARNING	DIFFERENT CONCEPTS/ BIAS	ADAPTING THERAPY COMMUNICATION	INTEGRAL	INTEGRAL AGENCIES: SCHOOL
14	West	Psychiatry	ABILITY/ LEARNING WIDER COMPLEX DIAGNOSTIC ASSESS. BEHAVIOURAL OBS	DIFFERENT CONCEPTS/ BIAS RELATIONAL	ADAPTING THERAPY COMMUNICATION CARE PLANNING	INTEGRAL SELF ESTEEM	INTEGRAL
15	West	Social Work	ABILITY/ LEARNING WIDER COMPLEX DIAGNOSTIC ASSESS.	RELATIONAL UNCERTAINTY	CARE PLANNING	INTEGRAL	INTEGRAL AGENCIES: SCHOOL

Figure 10: Care co-ordinators' understanding of cognitive assessment in CAMHS

Care Co-ordinator	Reason for referral	Anticipation of Outcome on therapeutic work	Helpfulness of assessment	Report	How results were used	Barriers to referral	Improvements?
1	NOT MADE A REFERRAL BEFORE	-	-	-	-	UNCERTAINTY	-
2	WIDER COMPLEX DIAGNOSTIC ASSESS.	DIAGNOSTIC CLARIFICATION (ASD)	Y - ELIMINATION PROCESS	LENGTH	AGENCIES: PARENTS, SCHOOL CARE PLANNING	UNCERTAINTY	-
3	NOT MADE A REFERRAL BEFORE	-	-	-	-	RESOURCES AGENCIES: EPs	-
4	WIDER COMPLEX DIAGNOSTIC ASSESS.	DIAGNOSTIC CLARIFICATION (ADHD vs. LD)	Y - DIAGNOSTIC CLARIFICATION AGENCIES: PARENTS	LENGTH 'REAL LIFE' LINKS	DIAGNOSTIC CLARIFICATION	RESOURCES AGENCIES: EPs UNCERTAINTY	EXTRA INFORMATION
5	WIDER COMPLEX DIAGNOSTIC ASSESS.	DIAGNOSTIC CLARIFICATION (ADHD vs. ASD) INFORM INTERVENTION	Y - ELIMINATION PROCESS	AGENCIES: SCHOOL	DIAGNOSTIC CLARIFICATION AGENCIES: SCHOOL	-	RESOURCES: PSYCH. CONSULTATION
6	WIDER COMPLEX ASSESSMENT	ELIMINATION PROCESS LEARNING NEEDS vs. PARENTING	Y - AGENCIES: PARENTS, SCHOOL	LENGTH	-	RESOURCES UNCERTAINTY	INCREASE PROFILE EXTRA INFORMATION
7	WIDER COMPLEX DIAGNOSTIC ASSESS	-	Y - DIAGNOSTIC CLARIFICATION	NOT READ VERBAL FEEDBACK	ELIMINATION PROCESS	RESOURCES	RESOURCES
8	WIDER COMPLEX DIAGNOSTIC ASSESS SCHOOL DIFFICULTIES	ELIMINATION PROCESS	Y - AGENCIES: PARENTS, SCHOOL	LENGTH	AGENCIES: PARENTS, SCHOOL	RESOURCES UNCERTAINTY	EXTRA INFORMATION
9	VISIBLE DIFFERENCE	AGENCIES: PARENTS, SCHOOL	Y	-	AGENCIES: SCHOOL DIAGNOSTIC CLARIFICATION	RESOURCES	RESOURCES
10	WIDER COMPLEX DIAGNOSTIC ASSESS. BEHAV. DIFFICULTIES	INFORM INTERVENTION	Y - BEHAVIOURAL OBS	VERBAL FEEDBACK	INDIVIDUAL WORK	RESOURCES	RESOURCES: PSYCH. CONSULTATION
11	WIDER COMPLEX DIAGNOSTIC ASSESS. BEHAV. DIFFICULTIES	DIAGNOSTIC CLARIFICATION (ADHD vs. ASD)	Y - DIAGNOSTIC CLARIFICATION	VERBAL FEEDBACK LENGTH	DIAGNOSTIC CLARIFICATION	RESOURCES	AGENCIES: EPs RESOURCES: PSYCH. CONSULTATION
12	WIDER COMPLEX DIAGNOSTIC ASSESS.	DIAGNOSTIC CLARIFICATION (ADHD) INFORM INTERVENTION	Y - ELIMINATION PROCESS	NOT READ	DIAGNOSTIC CLARIFICATION INFORM INTERVENTION	AGENCIES: EPs	REFERRAL PROCESS RESOURCES: PSYCH. CONSULTATION
13	WIDER COMPLEX DIAGNOSTIC ASSESS.	AGENCIES: SCHOOL INFORM INTERVENTION	Y	AGENCIES: SCHOOL	DIAGNOSTIC CLARIFICATION	RESOURCES	AGENCIES: EPs
14	WIDER COMPLEX DIAGNOSTIC ASSESS. BEHAV. DIFFICULTIES	DIAGNOSTIC CLARIFICATION (ADHD vs. ASD)	Y	LENGTH	DIAGNOSTIC CLARIFICATION AGENCIES: PARENTS	RESOURCES	RESOURCES
15	WIDER COMPLEX DIAGNOSTIC ASSESS.	INFORM INTERVENTION	Y	-	INDIVIDUAL WORK	RESOURCES	REFERRAL PROCESS

Figure 11: Care co-ordinators' experience of referral for cognitive assessment (consideration of last referral)

(a) Understanding of cognitive assessment

ABILITY/ LEARNING

The majority of the care co-ordinators interviewed conceptualised cognitive assessment as useful in ascertaining a child's current level of functioning with regards their overall ability to understand the world. For example:

"...To help clarify the child or young person's overall intellectual functioning, and to get information on their understanding of language as well" (care co-ordinator 10)

Identification of specific learning needs and the importance of screening for these was also highlighted as a key purpose:

"If difficulties are displayed in school, due to difficulties in learning and this is not picked up [cognitive assessment would be needed]" (care co-ordinator 4).

"To kind of assess cognitive ability – screening for any learning difficulties and thinking about strengths and weaknesses in individuals in terms of intelligence, something to do with verbal and non-verbal aspects of someone's profile, and...memory" (care co-ordinator 5).

PART OF WIDER COMPLEX DIAGNOSTIC ASSESSMENT

Many care co-ordinators raised the idea of cognitive assessment being used as one potential assessment component when the presenting problems were complex. Although not every response highlighting complexity focused on diagnosis, the idea of cognitive assessment aiding the diagnostic process was commonly expressed. For example:

"When I'm a bit confused about their presentation: if it's emotional or learning ability. Kids with possible ASD as well I'd ask for a cognitive assessment, because often there is confusion about whether it is a learning or a communication disorder. It's been helpful in pulling out what's been going on in those kids in the past" (care co-ordinator 6).

Differential diagnosis of specific psychiatric disorders featured within many responses, particularly ADHD:

"It's crucial in terms of ADHD assessment, provides an alternative explanation for fidgetiness and loss of concentration, for example" (care co-ordinator 4).

“[Cognitive assessment can be useful] in the context of another assessment e.g. an ADHD assessment” (care co-ordinator 15).

This may be a reflection of the high ADHD prevalence rates within CAMHS services, or perhaps an awareness and acknowledgement of the psychologist’s role with regards to cognitive assessment within the stand-alone ADHD clinic.

INFORM INTERVENTION

A number of care co-ordinators indicated that cognitive assessment had been useful in the past with regard to making informed choices about appropriate intervention. The following examples were typical of the responses comprising this theme:

“...when ADHD/ behavioural problems are secondary to learning problems, you might be considering the wrong treatment if learning problems are unrecognised” (care co-ordinator 10).

“...to help find the best intervention e.g. extra help at school, or if trying to do CBT, it may not be the best way to go” (care co-ordinator 8).

“I ask for them when I want to find out someone’s baseline for a talking intervention...” (care co-ordinator 6).

Three particular aspects of informed intervention were raised: cognitive assessment as critical in detection of learning needs; helping to guide care-planning decisions; or via the provision of information which would allow care co-ordinators to adapt or individually tailor therapeutic interventions.

UNCERTAINTY

Although the majority of care co-ordinators displayed a high level of knowledge regarding the utility of cognitive assessment, differing degrees of uncertainty were highlighted within a couple of interviews. One care co-ordinator stated:

“I don’t know, I’ve never referred anybody. No-one has ever explained it to me, the terminology is not very clear” (care co-ordinator 9).

Uncertainty regarding purpose, in this case, clearly served as a barrier to referral. In another instance, there existed some recognition of the purpose/ value of assessment but a lack of clarity regarding the role of cognitive assessment within different disorders:

“I’ve had two children I’m working with that have had it done outside of CAMHS. Both have a diagnosis of dyslexia. My understanding is limited – but for those kids it was assessments of learning... They were behind in terms of their learning. I know it’s done for ADHD assessments, but for these kids not sure if it was done as part of dyslexia or what” (care co-ordinator 3).

Within a few interviews, uncertainty was also highlighted regarding the impact of a child’s cultural background on cognitive assessment:

“It would be helpful to know how it impacts” (care co-ordinator 3).

“I don’t know the latest but back in the day there were concerns that they were culturally biased...I don’t know if the population the scores are drawn from are normed. There was a lot of controversy; but this was when I was at university” (care co-ordinator 8).

“I don’t know - it’s a good question. I expect this is something that the psychologists think about when assessing” (care co-ordinator 4).

Degrees of uncertainty ranged from not knowing at all whether cultural background was an issue (e.g. care co-ordinators 3 and 4); to having some ideas from previous experience but being unclear about current practice (care co-ordinator 8). Consideration of all interviews indicated that lack of familiarity regarding cultural constraints was not, however, seen as a barrier to referral. As highlighted by care co-ordinator 4 (above), this may reflect a belief that the responsibility for considering these issues lay with the perceived expertise of the psychologist, and therefore that the decision regarding the (un)suitability of assessment did not fall in their domain.

RELATIONAL

A few care co-ordinators highlighted the relational aspects of the testing environment and the impact of these on the assessment, particularly raised in response to cultural differences. The quote below demonstrates how one care co-ordinator conceptualised the limitations of testing:

“Even a cognitive assessment has a relational aspect. Even the way a child feels and connects with the psychologist. I knew they had to neutralise the tests but they can’t entirely. For example, a traumatised/displaced child will not be used to working one-to-one. You can just try to minimise that as far as possible, and as long as it is acknowledged, I don’t think it invalidates it” (care co-ordinator 2).

DIFFERENT CONCEPTS OF LEARNING/ BIAS

When asked about any beliefs they held regarding how a child’s cultural background might impact on cognitive assessment, the most common theme arising was that of the cultural Western bias implicit in the assessment batteries, and conjointly, the differing values that cultures might place on education, learning and assessment.

“There was a question around IQ tests- may be more biased towards some cultures, dominant to the English culture more than other cultures” (care co-ordinator 7).

“Maybe different cultures have different ideas about learning etc and what gets in the way” (care co-ordinator 5).

“I guess it does impact in all manner of aspects. For example, I worked with a travelling family with a long history of disengagement with education, poor reading and writing... The reading and writing skills aren’t valued at home” (care co-ordinator 11).

As the quotes above illustrate, many care co-ordinators displayed good knowledge of various aspects of the limitations of cognitive assessment. However, as observed within the theme of ‘uncertainty’, differing cultural background was not expressed as a reason against assessment. Care co-ordinator 12 expressed this sentiment best:

“It cannot not be Eurocentric. I don’t think it’s a reason to throw the baby out with the bathwater but I think it needs to be taken into account” (care co-ordinator 12).

(b) Understanding of relationship between learning difficulties and emotional or behavioural difficulties

INTEGRAL vs. SEPARATE

Care co-ordinators were asked about the extent to which they thought learning difficulties could be associated with emotional or behavioural difficulties in a child, and the impact of this belief on their therapeutic work explored. The majority of responses indicated care co-ordinators to perceive a connection between the two via different mechanisms (e.g. communication, frustration, self-esteem: see below). At either end, there were responses indicating beliefs that learning, emotional and behavioural problems were fundamentally linked ('integral') vs. distinct entities ('separate').

Seven out of the fifteen care co-ordinators explicitly outlined the interlinked nature of these difficulties. For example:

"I think there is a definite association, I think it depends on the child and family, the school, the context" (care co-ordinator 7).

"Dramatically [linked], right through from aetiology to precipitation to maintenance to therapeutic engagement, to acceptance with self and in society (school maybe). It is fundamentally linked. They might also not have other diagnoses if they didn't have learning difficulties" (care co-ordinator 14).

"No, totally linked. How can you separate them?" (care co-ordinator 15).

In contrast, one care co-ordinator saw certain difficulties as separable from emotional or behavioural difficulties, stating:

"It depends whether you classify ASD as a learning disability. ASD would be a major factor, other learning difficulties I'm not sure how much. I don't think other learning difficulties impact on personality or the ability to grow and develop" (care co-ordinator 1).

Similarly, although there was the odd exception, the majority of care co-ordinators subscribed to the view that a child's learning difficulties were best supported at least as part of the therapeutic interventions delivered (integral stance):

"I don't think you can separate them off, as a psychotherapist you have to be aware of this. If you have a very gifted child, you need to be aware of that, as you could be easily dismissed by not respecting that. Same for learning disabilities: there's no point in making interpretations that the child can't understand. I try to work with the whole child, not bits" (care co-ordinator 2).

"As part of the work, and integrated into the package of work... I don't like the idea of any aspect of therapy not being integrated with other treatment" (care co-ordinator 14).

At the other end of the spectrum, a more separatist view was held:

"I think it would be more the schools' role because we're not trained in that particular area" (care co-ordinator 9).

The integral vs. separate standpoint taken by the individuals interviewed was heavily associated with the related theme of agency responsibility, and who was best placed to support the child's difficulties.

AGENCIES

Differing degrees of agency responsibility were identified. Some care co-ordinators felt there to be a clear division between the role of CAMHS and schools (as highlighted by care co-ordinator 9, above). Others highlighted the need for multi-agency joined up working, but with different agencies taking on primary responsibility for different areas:

"If see learning difficulties, or school difficulties, [intervention] needs to be separate but joined up" (care co-ordinator 13).

"I think you have to take it into account... But offering the right support in the school environment is separate. And I think it is difficult sometimes to get the school to recognise that therapy is not always the answer" (care co-ordinator 4).

One care co-ordinator highlighted the importance of the parental role in supporting intervention:

"It's important to pay attention to parents' cognitive abilities as well... you're asking parents to understand things and to change sometimes too" (care co-ordinator 1).

COMMUNICATION

The importance of communication in the association between learning and emotional behavioural difficulties was frequently raised, particularly in relation to how this might impact on the therapeutic work conducted. For example:

“...there’s quite a lot of communication issues and you might need to be able to assess what their levels of expressive and receptive communication are... It’s not that it’s not possible to work with a child with lower... expressive language but it does help to know what that level is” (care co-ordinator 2).

ADAPTING THERAPY

Unsurprisingly, the issue of communication was often associated with adaptations that might be necessary within therapy:

“...You might need to take a behavioural approach rather than cognitive, sometimes” (care co-ordinator 5).

“Within formal Family Therapy, I think we often don’t take enough account of learning difficulties, with the team behind the screen. Feedback should be put into simple comments to make it understandable, and perhaps face-to face with eye contact” (care co-ordinator 10).

“...if they may have a specific difficulty such as dyslexia, you may not want to give them diaries for example” (care co-ordinator 11).

SELF ESTEEM and FRUSTRATION

In the exploration of the relationship between learning and emotional/ behavioural difficulties, the themes of self-esteem and frustration frequently emerged as potential mediating factors. Care co-ordinator 10 surmised this:

“It can lead to frustration, manifesting in anger. It can be associated with bullying, low self-esteem, poor achievement; school refusal can follow and children can get in a deeper hole in terms of what they miss” (care co-ordinator 10).

(c) Care co-ordinators' experience of the service

Care co-ordinators were asked to consider their last experience of referral. Figure 12 (below) highlights the range of referral frequency. The most common timeframe for last referral made was between 3-6 months.

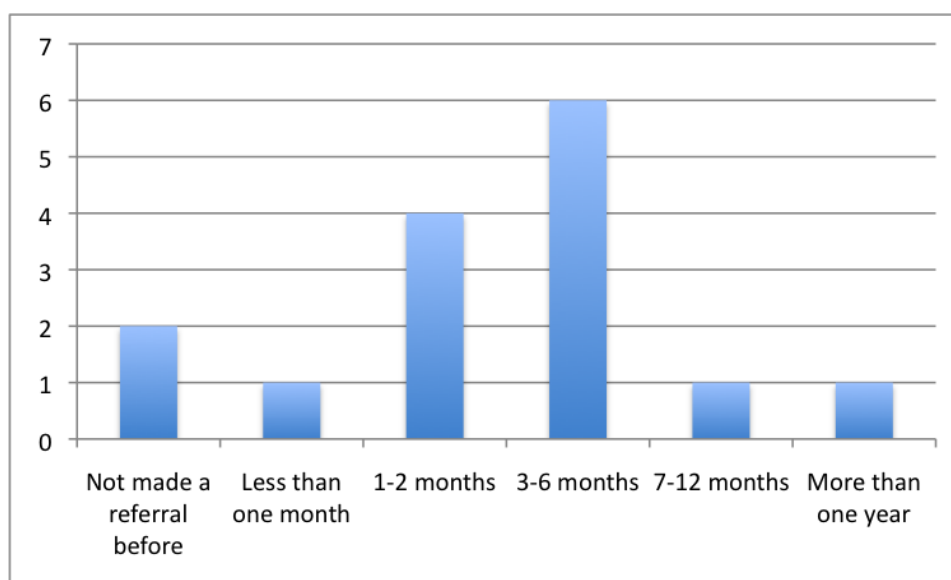


Figure 12: Length of time since last referral

DIAGNOSTIC CLARIFICATION

When asked to consider the last referral they had made for cognitive assessment and what they had wanted from it, a key theme arising was that of diagnostic clarification, with many care co-ordinators seeking to separate out differential diagnosis:

“He was being assessed for ADHD, had some symptoms. It was very unclear if he had ADHD; wondered if he had learning difficulties, as the problems were mainly at school” (care co-ordinator 4).

Care co-ordinators were also asked how, following the assessment, they had used the results in their therapeutic work with the child. Again, diagnosis featured heavily:

“Only [used] to inform diagnosis” (care co-ordinator 4).

“I didn’t follow up the work. It got the diagnosis – if it had happened at the beginning of my work, it might have informed my work a bit more” (care co-ordinator 13).

Others talked about the helpfulness of diagnosis for other agencies, such as school and parents:

“It often concludes the diagnostic process which can put a whole series of things in process - parents can access benefits, other organisations can get involved. It often finishes off a big piece of work, with parents switching from seeking answers to seeking solutions: it allows them to start doing something” (care co-ordinator 13).

AGENCIES vs. INDIVIDUAL UTILITY

A division between the primary utility of the assessment for other agencies compared to the usefulness for the care co-ordinator themselves in their work with the child was clear within the interviews. As highlighted by care co-ordinator 13 above, greater emphasis was often given to care-planning aspects of the work, and presumed value to other agencies of the assessment:

“It was useful for me to have an overall point of view, but I suspect it’s most useful for schools or the education field rather than me” (care co-ordinator 5).

Others highlighted assessment as useful in aiding their intervention with respect to parental interventions:

“I need to talk to mum about how she manages his behaviour, e.g. when she explains things to him, that she might need to show him as well as tell him” (care co-ordinator 8).

Interestingly, despite many care co-ordinators demonstrating good understanding of the potential adaptations to be made in a therapeutic intervention in other parts of the interview, when asked about their past experiences of utilising the results in their work with the child, none made reference to adapting their own style of interaction, and only one referenced a change in therapeutic approach:

“The assessment showed particular difficulties with language. We made the decision not to give access to Stress Busters due to his difficulties with language...” (care co-ordinator 10).

The role of clinical psychologists in CAMHS vs. educational psychologists (EP’s) in schools also featured heavily, with the tension between education and CAMHS highlighted:

“I really think Educational Psychology is the weak link, I do remember a time when they were much more proactive. Schools and EP’s used to do much more than they do now, we’re having to pick up the slack” (care co-ordinator 10).

In part, this tension appeared to reflect the underlying resource issues felt by the service, leading to a lack of clarity and potential barrier to referral within CAMHS:

“Sometimes there is an inconsistent response: e.g. being told that the EP’s should do this” (care co-ordinator 4).

RESOURCES

A lack of resources within psychology was consistently raised as a barrier to referral:

“I can think of one child now on my caseload where it would be helpful, but I know services are stretched so trying to get educational psychologist involved” (care co-ordinator 3).

“I often actively don’t refer because I know [psychologist] is stretched to her limits” (care co-ordinator 7).

“...the resource issue, it would be nice to have quite a lot of them tested. I do flag up the ones I think [but] I’m screening and don’t know if I’m screening appropriately. The other issue is thinking how long we’ll have to wait, although this hasn’t been my experience” (care co-ordinator 6).

As indicated by care co-ordinator 6 (above), many interviewees referred to wanting greater input from the psychologist within the assessment process. Care co-ordinators suggested that additional help with providing feedback to families and school, or the opportunity for a meeting with the psychologist to discuss the report would be helpful were resources not an issue:

“Maybe a little more help, time or detail spent talking to psychology to get advice on what would be helpful for me in my role as care co-ordinator in how to support them a bit more. Or sometimes more feedback to families, if there are issues there” (care co-ordinator 5).

“It hasn’t been my experience to have met up with whoever’s done the assessment and to talk over the report: this would be helpful” (care co-ordinator 12).

EXTRA INFORMATION

Suggestions for improvement of the current service focused on the provision of additional information and structure, in order to provide clarity and consistency for care co-ordinators thinking of making a referral:

“...sometimes cognitive assessments go from the front of my consciousness. Sometimes it is by chance that I take it to the meeting and [psychologist] suggests it. So maybe it would help to be really clear why cognitive assessments would be useful so the pre-referral bit is easier. Maybe ‘helpful hints’ on when to think about cognitive assessment would be useful” (care co-ordinator 6).

“I think it would be helpful for the psychologists to do a presentation at an academic slot to explain the usefulness of cognitive assessments, and when it is appropriate to have one or not” (care co-ordinator 8).

With regards to reports and written feedback, the value of summaries and clear links to ‘real life’ difficulties the child might be having was also raised:

“Making clearer the connection for what the score means, to give a good understanding of the overall picture. So if a child has an unusual or spiky profile, to really make the links to say ‘this means...’ ” (care co-ordinator 4).

3.3 Discussion

The interviews highlighted that the current cognitive assessment service offered by psychology was viewed favourably within the service, and that overall, a good understanding of the relevance of assessment existed amongst care co-ordinators. A number of manifestations of the association between cognitive and emotional/ behavioural difficulties were identified: difficulties within communication, frustration and low self-esteem, as well as additional diagnoses. The role of cognitive assessment as aiding diagnosis appeared to be given particular prominence. It was striking that despite potential adaptations to therapy and communication issues featuring strongly within care coordinators’ theoretical understanding; these themes were less prevalent when past experience of utilising assessment results was considered directly. Whilst there is a clear role for diagnostic clarification within CAMHS, with particular utility for supporting agencies such as parents and schools, there appeared to be a discrepancy between theoretical understanding of how this information could inform

direct clinical work with the child and its application. This may reflect the lack of confidence mentioned by many care co-ordinators in knowing when assessment was most appropriate; interpreting results; and wanting greater psychology input at various stages of the process, such as individual consultation following the report.

Therefore interviews also highlighted that differing degrees of uncertainty did exist: particularly when cognitive assessment would (and would not) be useful, and when appropriate to refer within CAMHS or to educational psychologists. Other potential barriers to referral, including child's cultural background and beliefs around cultural validity, did not appear to be influencing factors in the decision-making process. It appeared that care co-ordinators were keen to address gaps in their understanding of when they should be considering assessment, and suggestions for improvement were focused on greater education opportunities (academic slots or 'helpful hints' handouts) and greater opportunity for psychology consultation. Within the psychometric reports, care co-ordinators highlighted the need for clear summaries and links to 'real life' difficulties. Consistency in response to referrals also appeared to be an important factor, as many care co-ordinators felt unclear which service (CAMHS vs. education) was best placed to meet their needs. As recognised by most interviewees, the biggest challenge facing the service was that of resources however, and balancing the need for greater psychology input with that of what the team psychologists would realistically be able to provide. This was perhaps reflected in the reported length of time since care co-ordinators made their last referrals, which showed 3-6 months to be the average timescale.

It is important to acknowledge that as the interviews were conducted by a trainee who had previously been on placement with the service, on occasion there was some overlap between the assessments discussed within the interview and those conducted whilst on placement. However this did not appear to influence responses, and to maintain confidentiality between individual care co-ordinators and team psychologists it was felt that an external interviewer remained the best option.

4. SERVICE IMPLICATIONS

Consideration of both the case-note review and the interviews conducted as part of this study highlights the strengths of the service already being offered with regard to cognitive assessment. A fundamental challenge for the identified teams remains finding a balance between addressing need for cognitive assessment where appropriate whilst working within resourcing limitations, with a reduced number of psychologists. Part 1 of the study provides a baseline for future audit giving an initial indication of the number of assessments completed within a specified time-frame. The results highlighted that cognitive assessment was often used to provide an overall sense of a child's development (through delivery of the WISC and WPSSI), with less of a focus on identifying specific learning needs. Again, this may be an appropriate use of clinician time given demands on resources, although the literature perhaps suggests a greater emphasis on specificity. The case-note review serves as a first step towards ongoing monitoring of practice.

The interviews conducted in Part 2 highlighted that the team were very aware of resourcing issues - and that this did sometimes serve as a barrier to referral - but also that cognitive assessment was greatly valued. In order to promote greater consistency within the referral process and to ensure greater equity of access (at a time when the service was particularly under-resourced due to maternity leave on 3 of the 6 psychology posts), a formal referral system was introduced during the implementation of this project (see Appendix C), based on the referral form developed by Humphrey (2006). It is hoped this would also allow psychologists to develop clear criteria for 'appropriate' referrals, as well as to develop screening guidelines. Additionally, future service investigations would therefore be able to audit *all* referral for cognitive assessment including those declined, in order to continue monitoring service provision.

4.1 Recommendations

Care co-ordinators made a number of suggestions for improvement during the interviews.

- Psychology to raise profile of cognitive assessment within team so remains at forefront of care co-ordinators' minds.
- An academic teaching slot to provide further information about cognitive assessment, and when it might be useful.
- Provision of a 'helpful hints' handout regarding when to refer for cognitive assessment.
- Psychologists to consider the length of the report and provide clear, concise summaries which explain implications of results to real-life.
- Psychologists to meet with care co-ordinators face –to–face prior to the assessment to identify needs and for a brief follow-up to clarify findings and how this might link to own therapeutic work, as well as considering usefulness for other agencies.

Figure 13: Care co-ordinator recommendations

4.2 Feedback to service

The results of this investigation were presented at the monthly service-wide psychology meeting. The recommendations above were discussed and further ideas generated regarding how best to take this work forward. To address care co-ordinators' interest and need for the provision of extra information, it was felt that a teaching day on cognitive assessment would be valuable and easily achievable (potentially to be incorporated as part of the CAMHS teaching slots that are already in place). Additionally, psychologists were keen to allocate time within a psychology meeting to begin the generation of a list of criteria referral, with the dual aims of aiding clarity for other referring professions and promoting consistency within the referrals accepted. It was also hoped this would maintain the profile of cognitive assessment within the team. Other recommendations fed back to the service included the value of future audit, against the baseline established in Part 1 of this study.

A potential extension of the research was also discussed for the future, with psychologists keen to consider parents' experiences of cognitive assessment, including their views on the utility and accessibility of written reports as well as the verbal feedback given.

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Appendix A: Application for Audit Approval

Audit & Service Evaluation Project Proposal Form (PPF)

For team based/borough wide projects, please send your completed PPF to your local CG Project Officer, for ethical approval. For Trustwide projects please send your completed PPF to the Corporate Audit Dept (All relevant contact details are on the SLaM CG & Audit Intranet site).

(CG Department use only)		
Date Received:	Project Ref. Number	
1(a) Project lead details		
Name: Kristen Warnock		Job title: Trainee Clinical Psychologist
Work Address: Addiction Sciences Building, Institute of Psychiatry, 4 Windsor Walk, SE5 8AF		
Telephone: 07590 640 345		E-mail: Kristen.Warnock@slam.nhs.uk
1(b) Project Title: Review of referrals accepted for neuropsychological assessment within a Child and Adolescent Mental Health Service.		
Project start date: June 2010		Project end date: January 2011
1(c) Please tick ✓ one box: Is this project a:		
Clinical Audit (eg, Measures a standard) <input type="checkbox"/>		A Service Evaluation (eg, Patient Survey) <input checked="" type="checkbox"/>
1(d) Which SfbH Standards does this audit relate to: Please tick ✓ relevant boxes:		
Safety <input type="checkbox"/>	Clinical & Cost Effectiveness <input type="checkbox"/>	Governance <input type="checkbox"/>
Patient Focus <input checked="" type="checkbox"/>	Assessable and Responsive Care <input type="checkbox"/>	Care Environment and Amenities <input type="checkbox"/>
Public Health <input type="checkbox"/>		
2 (a) Overall project aim, eg, purpose of the audit, are changes achievable etc.		
<p>The aim of the project will be to retrospectively review the referrals for neuropsychological assessment within selected teams in Lewisham CAMHS over a one-year period (2009-2010). The project will aim to establish: (a) the number of neuropsychological assessments carried out, and (b) the characteristics of the referrals (including original reason for referral), factors which are currently unknown. It is hoped that this project will be a first step in establishing the type of referrals currently being accepted by psychologists, as well as any barriers perceived by the referring members of the team (Care Co-ordinators) which may impact on their decision to refer. As clear referral criteria as to what cases are appropriate for neuropsychological assessment do not currently exist within Lewisham CAMHS, it is hoped that this project can help contribute to the creation of clear referral guidelines for the teams and therefore greater consistency and equity of access across the accepted referrals. This would lead to an improved neuropsychological service for both the referring staff and service users.</p>		

2(b) Specific objectives. What are the audit guidelines or standards?

The project will firstly aim to establish the number of referrals that were accepted for neuropsychological assessment within a given time frame (it is anticipated that this will be a one-year period). It will then consider the characteristics of the accepted referrals – including reason for referral and outcome of referral. These are factors that are currently unknown, and therefore there are no guidelines/standards against which to measure these currently. This will provide a baseline for future audit. This will be achieved through a case-note review of neuropsychological reports of assessments carried out by psychologists within the specified period.

Care co-ordinators across the teams will be interviewed about their views of neuropsychological assessment and the way in which this fits in with their work in a CAMHS team. The objective is to establish perceptions of neuropsychology within the referring disciplines, and to identify potential barriers for referral, as well as areas in which it is felt that the service could be improved. Identifying these factors will be a first step towards allowing these to be addressed, with the overall aim of improving the quality of the service offered.

2 (c) In which ways do you think the project will improve patient care / outcomes?

The project will establish the current numbers and characteristics of referrals for neuropsychological assessment within certain teams in Lewisham CAMHS, which is currently unknown. By establishing these factors, it will enable more specific referral guidelines to be drawn up in the future. Clear referral criteria will allow the service to become more consistent and equitable in its delivery of neuropsychology to patients. By gaining a greater understanding of the care-coordinators' views of neuropsychological assessment, patient outcomes will be improved as psychologists can ensure that neuropsychological assessments help inform more appropriate and effective care plans for children under Lewisham CAMHS.

The project will also provide a baseline measure against which audit can take place in the future (e.g. to monitor increase/decrease in service provision, or the impact of the introduction of explicit referral criteria to teams).

3 (a) Type of project Please Tick ✓ where appropriate – more than one might apply

(A) National	<input type="checkbox"/>	Mandatory	<input type="checkbox"/>	Non-mandatory	✓
(B) Trust-wide	<input type="checkbox"/>	Directorate/Borough based	<input type="checkbox"/>	Team based	✓
(C) Multidisciplinary	✓	Uni-disciplinary	<input type="checkbox"/>		
(D) Multi-agency	<input type="checkbox"/>				

Other (please state):

3 (b) Does your project criteria apply to any of the following? If so Please Tick ✓ where appropriate

NHS Litigation Authority (NHSLA)	<input type="checkbox"/>	National Service Framework	<input type="checkbox"/>	Risk Register	<input type="checkbox"/>
Trust Policy	<input type="checkbox"/>	SfBH	<input type="checkbox"/>	Patient Survey	<input type="checkbox"/>
NICE guidance	<input type="checkbox"/>	Business Plan	<input type="checkbox"/>	DOH Policy Implementation Guidance	<input type="checkbox"/>
National audit	<input type="checkbox"/>	Improving working lives	<input type="checkbox"/>	Issue of local concern	<input type="checkbox"/>

Other (please state):

N/A

4(a) Who will be on the audit steering group and what consideration has been given to the involvement of patients, carers or the public?

Kristen Warnock (Trainee Clinical Psychologist) supervised by Dr. Laura Lunt (Clinical Psychologist in East Team, Lewisham CAMHS) will be leading this project. Individual patients, carers and the public will not be directly involved, and no personal identifiable information will be collected either from the case-note review of neuropsychological reports, or from the interviews.

5. Type of data:		
5(a) Does the project involve transfer of personal identifiable information (PII)? a) Name, address, full post code, DoB b) NHS Number c) Photographs, videos, audio-tapes or other images of service users d) Anything else that may be used to identify a service user directly or indirectly eg rare disease, drug treatments or statistical analysis which have very small numbers within a small population and may allow individuals to be identified.	a) Yes <input type="checkbox"/>	No ✓
	b) Yes <input type="checkbox"/>	No ✓
	c) Yes <input type="checkbox"/>	No ✓
	d) Yes <input type="checkbox"/>	No ✓
If yes, are the Caldecott principles met? What is the justification for using PII?	N/A	
5(b) Will the PII be recorded on paper eg questionnaires?	Yes <input type="checkbox"/>	No ✓
If yes, what security measures are in place i.e questionnaires never to be left unattended	N/A	
5(c) Will the PII be recorded on a database?	Yes <input type="checkbox"/>	No ✓
If yes, can you confirm the database will be saved onto a secure server eg a SLAM U drive (Please note PII information should never be saved onto a C drive, removable media, a laptop or a home computer).	The data regarding numbers of referrals and specific referral characteristics will be saved onto the SLAM U: drive only. Personal identifiable information will not be placed on the database.	
5(d) Will the data be transferred out of SLAM?	Yes <input type="checkbox"/>	No ✓
If yes, what is the justification? Has an Information Processing Agreement (IPA) been signed? (Please note PII information should not be transferred out on email or removable media and only sent out by the secured GSI email system. PII information should either be sent by courier, recorded delivery or by hand delivery. (Please refer to the SLAM Policy Safe Storage and transfer of Data guidelines).	N/A	
5(e) How long with the PII data be stored for? Please note the PII data should be deleted once the report has been finished.	The data will be kept for the duration of the project, and will be deleted when the report has been finished and submitted as part of my DClinPsy.	

For more information on Information Governance, please contact:
The Trust Information Governance Team: ictstandardsteam@slam.nhs.uk
Or : 0203 228 3674 (83674)

6) Data Collection (please answer all of the following questions)

<p>6(a) Where from? Audit data can be collected from many sources including: medical records/epjs, nursing records, patients, clinicians, and other staff.</p>	<p>Data regarding previously conducted neuropsychological assessments will be collected directly from the psychologists within Lewisham CAMHS. Psychologists will be asked to submit their reports from the period for case-note review.</p> <p>Data regarding views of neuropsychology will be collected by semi-structured interview from Care Co-ordinators across these teams.</p>
<p>6(b) How? The data source will obviously influence the method used to collect data. E.g. If data is to be collected from patients the most appropriate method might be a survey or interview. If data is to be collected from medical records, it will be necessary to design a data collection proforma. Questionnaires, one-to-one interview, focus groups.</p>	<p>Psychologists will be asked to review their own records of their neuropsychological reports, and to send them to the project lead (Kristen Warnock), who will extract the relevant information e.g. reason for referral/ outcome of referral.</p> <p>Data regarding the teams' view of the neuropsychology referral system will be collected through semi-structured interview with Care Co-ordinators in the team.</p>
<p>6 (c) How much? As a guide, a sample should include a minimum of 30 cases and perhaps as many as 100. If the initial sample proves to be too small to provide data necessary, it can be added later.</p>	<p>The number of neuropsychological assessments to be reviewed in the initial part of the project is currently unknown. Psychologists will be asked to submit all neuropsychology assessments carried out within a one-year period; however if this yields limited data, this time-frame may be extended to 2 years.</p> <p>A minimum of 10 Care Co-ordinators will be interviewed.</p>
<p>6 (d) Who? Who will be responsible for collecting the data? Ensure the person identified understands their role.</p>	<p>Kristen Warnock (Trainee Clinical Psychologist), supervised by Dr. Laura Lunt (Clinical Psychologist, Lewisham CAMHS).</p>
<p>6(e) Timescale? Over what period is the data to be collected?</p>	<p>The data will be collected over the course of June – September 2010. The report will be submitted at the end of my DClinPsy in 2012.</p>
<p>6 (f) Pilot Audit? Y/N In most cases it will be advisable to carry out a pilot to check quality of questionnaire, length of interview, etc. In light of the pilot audit findings, modifications to any of the above may need to be made.</p>	<p>Yes. Initial data will be collected from psychologists regarding a one-year period of neuropsychological assessment. If this data is considered too limited to answer the questions posed by the project, the one-year time-frame may be expanded.</p>
<p>7(a) Who will be affected by the outcomes of this project?</p> <p>The outcomes of the project will affect the provision of neuropsychology within Lewisham CAMHS and it is hoped will lead to clarity for both referrers and psychologists as to the service that can be offered. It is hoped that patients will benefit from more consistent and equitable access as a result of clearer referral criteria, and more appropriate care plans which better address their needs.</p>	

<p>7(b) With whom and where will the final report be shared? i.e Local CG Committees, CAE Committee?</p> <p>The final outcomes and report will be shared with the participating teams at the team meetings. In addition, the report will be fed back at a Psychology meeting in order to allow for more specific discussion of the ways in which the findings could influence the development and improvement of the neuropsychology service.</p>
<p>7c) Who will take responsibility for disseminating the results of the project and following through recommendations? And how and when will the recommendations be evaluated, monitored and reviewed?</p> <p>Kristen Warnock (Trainee Clinical Psychologist) and Dr. Laura Lunt will be responsible for feeding back results to the relevant team meetings and to the psychology meeting. Dr. Laura Lunt, as a Clinical Psychologist within East Team, will take the lead on following through on the recommendations from the project (particularly the establishment of specific referral criteria if appropriate) and will continue to monitor and review these at regular intervals in the future.</p>
<p>All completed projects must be followed up with a completed recommendations monitoring form, available on the SLaM CG & Audit intranet site</p> <p>http://sites.intranet.slam.nhs.uk/cg/default.aspx</p>

8) Ethical Approval	
<p>Ethics approval given by:</p> <p><u>Michael Buxton</u></p> <p>Date ethically approved:</p> <p><u>22/06/10</u></p>	<p><input type="checkbox"/> Clinical Effectiveness and Audit Committee</p> <p><input type="checkbox"/> Drugs and Therapeutics Committee</p> <p><input checked="" type="checkbox"/> X Directorate Clinical Governance/Audit Committee</p>

9 (a) For which of the following do you consider you may need assistance from the Local Clinical Governance or Corporate Audit Department?	
Literature searches	<input type="checkbox"/>
Developing standards	<input type="checkbox"/>
Initial meetings	<input type="checkbox"/>
Planning meetings	<input type="checkbox"/>
Questionnaire design	<input type="checkbox"/>
Pilot	<input type="checkbox"/>
Amendments to questionnaire	<input type="checkbox"/>
Data collection	<input type="checkbox"/>
Data analysis	<input type="checkbox"/>
Report writing	<input type="checkbox"/>
Presentation writing	<input type="checkbox"/>
Presentation	<input type="checkbox"/>
Binding of report and distribution	<input type="checkbox"/>
Make recommendations for improvement	<input type="checkbox"/>
Other assistance (please state what you require)	<input type="checkbox"/>


Appendix B: Interview with care co-ordinators

The purpose of this interview is to ask a few questions about your experience of referring the children you work with for cognitive assessment. We are simply interested in your views and are not testing you – there are no right or wrong answers.

Our aim is to make cognitive assessments more accessible in the service, and to improve the quality of the service offered whilst managing the demand. Therefore it is important for you to be as honest as possible in your answers.

1. Team and CC background (Social Work, Psychotherapy, Psychiatry etc):
2. What is your understanding of the purpose of a cognitive assessment?
3. Do you think that a child's learning difficulty could impact on the therapeutic work you do with them? Why/ why not? In what way?
4. When was the last time you made a referral to a psychologist for cognitive assessment?
 - a. Date (last month, 3 months, 6 months etc):
 - b. Age of child:
 - c. Reason for assessment:
 - d. How did you anticipate the outcome of this would impact on your therapeutic work?
 - e. How long did it take to get the assessment (timely)?
 - f. How helpful did you find the assessment? Did it answer your question?
 - g. How helpful was the report? Was it comprehensible?
 - h. How did you use the results of this assessment in your work with the child?
 - i. What suggestions for improvement would you make?
5. Is there anything that currently stops/ would stop you from referring a child for a cognitive assessment?
6. Do you have any views on how a child's culture might impact on a cognitive assessment?
7. To what extent do you think that learning difficulties can be associated with emotional or behavioural difficulties in a child? Why/ why not?
8. To what extent do you think that a child's learning difficulties are best supported as part of, or separately to, the therapeutic intervention?

Appendix C: Referral form

South London and Maudsley 
NHS Trust

Referral form for Psychometric Testing within Lewisham CAMHS

Name:

Date of Birth:

Care Co-ordinator:

Reason for Referral:

Information from School on attainments, impression of ability and behaviour in class:

Please attach completed school report.